SOIL SURVEY

Western Riverside Area California

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
UNITED STATES DEPARTMENT OF THE INTERIOR
Bureau of Indian Affairs
In cooperation with
UNIVERSITY OF CALIFORNIA AGRICULTURAL EXPERIMENT STATION
Issued November 1971

Major fieldwork for this soil survey was completed in 1963. Soil names and descriptions were approved in 1967. Unless otherwise indicated, statements in this publication refer to conditions in the Area at the time the survey was in progress. This survey was made cooperatively by the Soil Conservation Service, the Bureau of Indian Affairs, and the University of California Agricultural Experiment Station. It is part of the technical assistance furnished to the Elsinore-Murrieta-Anza; Riverside-Corona; San Gorgonio; San Jacinto Basin; and the West End (Riverside County part) Soil Conservation Districts.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, USDA, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms, ranches, and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for agriculture, industry, and recreation.

Locating Soils

All the soils of the Western Riverside Area are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the Area in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described, the page for the capability unit and the page for the range site in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units and range sites.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Wildlife."

Ranchers and others can find, under "Use of the Soils for Range," groupings of the soils according to their suitability for range, and also the names of many of the plants that grow on each range site.

Community planners and others can read about soil properties that affect the choice of sites for recreation areas in the section "Recreational Development."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation, Morphology, and Classification of Soils."

Newcomers in the Western Riverside Area may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the Area" which gives additional information about the survey area.

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SOIL SURVEY OF WESTERN RIVERSIDE AREA, CALIFORNIA

BY ARNOLD A. KNECHT, SOIL SCIENTIST, SOIL CONSERVATION SERVICE

FIELDWORK BY ARNOLD A. KNECHT, FLOYD G. STEPHENS, CONRAD R. SIMONSON, PAUL I. VLASOFF, JEROME L. KOSTER, AND RICHARD W. KOVER, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, AND UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS IN COOPERATION WITH UNIVERSITY OF CALIFORNIA AGRICULTURAL EXPERIMENT STATION

THE WESTERN RIVERSIDE AREA is east of the Los Angeles Basin (fig. 1). It is made up of the western one-third of Riverside County. Two national forests are adjacent to the Area. The San Jacinto Ranger District of the San Bernardino National Forest is to the east in the San Jacinto Mountains, and the Trabuco Ranger District of the Cleveland National Forest is on the western edge in the Santa Ana Mountains. These forests are excluded from this survey. Also excluded is the March Air Force Base. The total extent of the survey area is approximately 1,105,940 acres, or about 1,728 square miles.

Riverside County is south of the San Bernardino Mountains, east of the Santa Ana Mountains, and north of the Aqua Tibia and Palomar Mountains. It includes the San Jacinto Mountains and the northern part of the Santa Rosa Mountains and extends across the Coachella Valley to the Colorado River. The county is roughly 190 miles from east to west, and 42 miles from north to south. About one third of the county is mapped in the survey area.

Figure 1.—Location of Western Riverside Area in California

The soils in the survey area are nearly level to very steep and are suitable for many kinds of crops. Many areas are irrigated, but large areas are used for dry-farmed crops. A large area of rocky soils has a cover of brush and is pastured. Irrigation water was brought to the Area as early as the 1870's, and much citrus was planted near the city of Riverside. The Washington navel orange was first planted in the Area in 1920. Since then the Area has produced large amounts of this popular orange for the market. The irrigated areas are also used for truck crops, alfalfa, grapes, and permanent pasture. In the dryfarmed areas, barley and wheat are the major crops.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in the Western Riverside Area, where they are located, and how they can be used. They went into the Area knowing they likely would find many soils they had already seen and perhaps some they had not. As they traveled over the Area, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of plants or crops; kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in areas nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. For successful use of this survey, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or

other geographic feature near the place where a soil of that series was first observed and mapped. Murrieta and Soboba, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the natural landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Arlington loam, 2 to 5 percent slopes, is one of several phases within the Arlington series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. The mapping units of this kind shown on the soil map of the Western Riverside Area are undifferentiated groups.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Ramona and Buren loams, 5 to 15 percent slopes, eroded, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Badland is a land type in the Western Riverside Area.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are also assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all the soils.

The soil scientists set up trial groups of soils on the basis of yield and practice tables and other data they have collected. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. Then they adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in the Western Riverside Area. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing associations is useful to people who want a general idea of the soils in the Area, who want to compare different parts of an Area, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The Western Riverside Area consists of two physiographic sections. These are the Southern California Coastal Plain and the Southern California Mountains. Associations 1 through 8 are on the plain, and the other two associations are on the mountains.

Soils of the Southern California Coastal Plain

This physiographic section is made up of soils in intermediate valleys or in intermountain valleys at a low elevation. Most of the areas consist of deep alluvial fills that extend into uplands that surround valleys. Elevation ranges from 500 to 3,500 feet, and annual rainfall from 9 to 18 inches. The average annual temperature is 59° to 65° F., and the frost-free season is about 200 to 300 days. The Coastal Plain is traversed by several large fault zones and faults that have contributed greatly to the easily delineated separation of valley soils and upland soils. The Southern California Coastal Plain is in Land Resource Area 19. It contains eight soil associations.

1. Cajalco-Temescal-Las Posas association

Well-drained, undulating to steep, moderately deep to shallow soils that have a surface layer of fine sandy loam and loam; on gabbro and latite-porphyry

This soil association is in the western part of the survey area. The soils are well drained. Slopes range from 2 to 50 percent. The areas that are hilly to steep generally are rocky but in places are cobbly or stony. Other areas occur as islands in an intermediate valley. Elevation ranges from 900 to 3,500 feet. Average rainfall is 9 to 18 inches, the average annual temperature is 59° to 65° F., and the frost-free season ranges from 230 to 300 days.

This association makes up about 10 percent of the survey area. Cajalco soils make up about 40 percent; Temescal soils, 15 percent; Las Posas soils, 15 percent; and minor soils and Lake Mathews, the remaining 30 percent.

Cajalco soils generally are moderately deep. Their surface layer is yellowish-brown, slightly acid fine sandy loam. Their subsoil is brown and light yellowish-brown, neutral loam. The substratum is light yellowish-brown, mildly alkaline, well-weathered gabbro. In places rocks crop out and cover 2 to 10 percent of the surface.

Temescal soils are shallow. Their surface layer is grayish-brown and brown, slightly acid and neutral loam. Their substratum is partly weathered, fractured latite-porphyry.

Las Posas soils are shallow to moderately deep. Their surface layer is reddish-brown, slightly acid loam and clay loam. The subsoil is dark-red, neutral clay and heavy clay loam, and the parent material is weathered gabbro. In some areas stones are on the surface, and in others rocks crop out and cover 2 to 10 percent of the surface.

Minor soils of this association are the Altamont, Auld, Bosanko, Honcut, Murrieta, and Porterville, and areas of the miscellaneous land types Rock land and Rough broken land. Honcut soils occur in small bodies in drainageways, and Bosanko soils occur where the supply of moisture and the parent rock are favorable for clay formation.

The soils of this association are used chiefly for pasture and grain. If irrigation water is available, citrus is grown on soils where the climate is suited. The soils are also used for homesites, for recreation areas, and as wildlife habitat.

2. Friant-Lodo-Escondido association

Well-drained and somewhat excessively drained, undulating to steep, shallow to deep soils that have a surface layer of fine sandy loam and gravelly loam; on metamorphosed sandstone and mica-schist

This association is on uplands throughout the survey area. The soils are mainly on islands of metamorphosed sandstone and mica-schist rock in the intermediate valley and on foothills of the Santa Ana Mountains. They are well drained and somewhat excessively drained. Slopes range from 2 to 50 percent. Elevation ranges from 700 to 3,000 feet, and the average annual rainfall ranges from 10 to 14 inches. The average annual temperature is 59° to 65° F., and the frost-free season is 210 to 280 days.

This association makes up about 8 percent of the survey area. Friant soils make up 40 percent of the association; Lodo soils, 40 percent; Escondido soils, 10 percent; and minor soils, the remaining 10 percent. The hilly to steep, rocky areas generally are Lodo soils, though some of these consist of Friant soils and of minor soils.

Friant soils are well drained and generally are shallow to weathered mica-schist. They are very dark grayish-brown and brown, neutral and slightly acid fine sandy loam throughout.

Lodo soils are somewhat excessively drained and are shallow to shattered and weathered, fine-grained metamorphosed sandstone, which is underlain by hard sandstone. They are brown, slightly acid gravelly loam throughout.

Escondido soils are well drained and are moderately deep to deep. Their surface layer is brown, medium acid fine sandy loam and very fine sandy loam. The subsoil is brown, medium acid and slightly acid very fine sandy loam. Below is fine-grained metamorphosed sandstone and schist.

Minor soils of this association are the Honcut and Vallecitos soils and the thick surface variant of the Vallecitos soils. Other small areas consist of the land types Rock land and Wet alluvial land. Honcut soils and Wet alluvial land occur in the larger drainageways. The hilly to steep, rocky Vallecitos soils are on uplands. Rock land generally occurs on the upland crests.

The soils of this association are used chiefly for grain and pasture. If irrigation water is available, citrus is grown on soils where the climate is suited. The soils are also used for recreation areas and as wildlife habitat.

3. Cieneba-Rock Land-Fallbrook association

Well-drained and somewhat excessively drained, undulating to steep, very shallow to moderately deep soils that have a surface layer of sandy loam and fine sandy loam; on granitic rock

The soils of this association are on uplands. They are mainly on granitic rock islands in the intermediate valleys and on the foothills of the San Jacinto Mountains. Many alluvial fans emanate from these islands. Slopes range from 2 to 50 percent. Elevation ranges from 700 to 3,500 feet, and the average annual rainfall ranges from 9 to 16 inches. The average annual temperature is 59° to 65° F., and the frost-free season is 200 to 300 days.

This association makes up about 16 percent of the survey area. Cieneba soils make up 55 percent of this association; the land type Rock land, 15 percent; Fallbrook soils, 15 percent; and minor soils, the remaining 15 percent.

Cieneba soils are steeper and more rocky than the other soils of the association. They generally are shallow, hilly to steep, somewhat excessively drained soils. Their surface layer is brown, medium acid sandy loam. The underlying material is light yellowish-brown, slightly acid gravelly coarse sand that rests on weathered granitic rock. Rocks crop out and cover 2 to 10 percent of the surface.

Rock land is steep and very shallow. Rocks crop out and cover 35 to 60 percent of the surface.

Fallbrook soils, which are well drained and moderately deep, occupy the smoother, less rocky areas. The surface layer is brown, slightly acid and neutral sandy loam. The subsoil is reddish-brown, neutral sandy clay loam underlain by weathered granite. In some places the Fallbrook soils are severely eroded and their subsoil is exposed. Rocks crop out and cover 2 to 10 percent of the surface in other areas.

Minor soils of this association are Arlington, Bonsall, Bosanko, Buren, Vista, and Visalia. Bonsall soils occur in small spots in the more nearly level areas where favorable moisture conditions exist. Bosanko soils occur in areas where the parent rock was rich in weatherable minerals.

The soils of this association are used chiefly for pasture and dryfarmed grain. If irrigation water is available, citrus generally is grown on moderately deep, undulating to rolling soils where the climate is suited. The soils are also used for homesites, for related community purposes, for recreation, and as wildlife habitat.

4. Badland-San Timoteo association

Well-drained, rolling to very steep, moderately deep calcareous loam, and very shallow soils; on inland sea sediment and soft sandstone

This soil association is on uplands. The soils are on continental sea deposits that have been severely dissected and eroded. The parent material is weakly consolidated calcareous shale, arkose, and sandstone of the San Timoteo Formation. Slopes range from 8 to 75 percent. Elevation ranges from 1,200 to 2,500 feet, and the average annual rainfall from 12 to 15 inches. The average annual temperature is 60° to 64° F., and the frost-free season is 220 to 250 days.

This association makes up about 4 percent of the survey area. The miscellaneous land type Badland makes up 65 percent of the association; San Timoteo soils, 25 percent; and minor soils, the remaining 10 percent.

Badland is steep to very steep. It consists of acid igneous alluvium that originally was deposited in an inland sea. Later the area was elevated above the water, was deformed by geologic processes, and then was severely eroded and dissected by drainageways. The original landform has been destroyed.

The San Timoteo soils are rolling to steep and are moderately deep. The surface layer is pale-brown and light-gray, moderately alkaline loam. The substratum is light-gray, moderately alkaline loam, and is underlain with weathering, soft sandstone.

Minor soils are Greenfield, Metz, Ramona, and San Emigdio, and areas of the land type Rough broken land. Metz and San Emigdio soils are in drainageways that originated in the Badland. The Greenfield soils and moderately deep Ramona soils occur as remnants of a deposit of granitic alluvium that overlies the deposit left by the continental sea.

The soils of this association are used chiefly for range and pasture, but dryfarmed grain is grown in some areas. Also, large areas are used for recreation and as wildlife habitat.

5. Hanford-Tujunga-Greenfield association

Very deep, well-drained to excessively drained, nearly level to moderately steep soils that have a surface layer of sand to sandy loam; on alluvial fans and flood plains

The soils of this association are on short alluvial fans and on flood plains. They are excessively drained to well drained. These soils formed in granitic alluvium washed from the uplands. Slopes range from 0 to 25 percent. Elevation ranges from 600 to 3,500 feet, and the average annual rainfall ranges from 9 to 18 inches. The average annual temperature is 59° to 64° F., and the frost-free season is 200 to 280 days.

This association makes up about 24 percent of the survey area. Hanford soils make up 30 percent of the association; Tujunga soils and Greenfield soils, 20 percent each; and minor soils, the remaining 30 percent.

Hanford soils are well drained and somewhat excessively drained. Their surface layer is grayish-brown, slightly acid coarse sandy loam and cobbly coarse sandy loam. The underlying material is brown, slightly acid coarse sandy loam and loamy sand.

Tujunga soils are excessively drained. Their surface layer is light-gray, neutral loamy sand and gravelly loamy sand. The underlying material is light-gray, neutral fine sand and sand.

Greenfield soils are well drained. Their surface layer is brown, slightly acid and neutral sandy loam. The subsoil is brown and pale-brown, neutral and mildly alkaline loam. It is underlain by a substratum of moderately alkaline, stratified granitic alluvium.

Minor soils of this association are Arlington, Buren, Gorgonio, Grangeville, Hilmar, Honcut, Pachappa, Ramona, and Visalia, and the land type of Riverwash.

The soils of this association are used for dryfarmed grain and pasture. They also are used for irrigated alfalfa, truck crops, citrus, fruit crops, grapes, and grain. In addition large areas are used for homesites and related purposes.

6. Monserate-Arlington-Exeter association

Well-drained, nearly level to moderately steep soils that have a surface layer of sandy loam to loam and are shallow to deep to a hardpan

This association occupies old alluvial fans and terraces. The areas are dissected by drainageways, or barancas, that have flat bottoms and steep sides. The soils of this association formed in granitic alluvium washed from the San Jacinto Mountains, from the Woodcrest area, and from islands in the valley floors. Slopes range from 0 to 25 percent. Elevation ranges from 500 to 2,500 feet. The average annual rainfall ranges from 9 to 15 inches, the average annual temperature from 61° to 64° F., and the frost-free season from 220 to 300 days.

This association makes up about 9 percent of the survey area. Monserate soils make up about 30 percent of the association; Arlington soils, 15 percent; and Exeter soils, 15 percent; and minor soils, the remaining 40 percent.

Monserate soils are shallow to moderately deep. They have a brown and yellowish-red, slightly acid surface layer of sandy loam. Their subsoil is reddish-brown, neutral sandy loam. Below is an indurated hardpan that contains seams of calcareous material.

Arlington soils are moderately deep to deep. Their surface layer is brown, neutral loam or fine sandy loam. The subsoil is mainly reddish-brown, mildly alkaline loam, underlain by weakly cemented, moderately coarse textured granitic alluvium.

Exeter soils are moderately deep to deep. Their surface layer is brown, medium acid and slightly acid sandy loam. The subsoil is brown, neutral and moderately alkaline loam. Below is an indurated hardpan.

Minor soils of this association are Arbuckle, Buren, Cortina, Garretson, Honcut, Madera, Perkins, Placentia, Wyman, and Yokohl, and areas of the land type Terrace escarpments.

The soils of this association are used chiefly for dryfarmed grain and pasture. If irrigation water is available, truck crops, alfalfa, grain, and citrus are grown where the climate is suited. The soils are also used for homesites and for related purposes.

7. San Emigdio-Grangeville-Metz association

Very deep, poorly drained to somewhat excessively drained, nearly level to strongly sloping soils that have a surface layer of calcareous loamy sand to loam; on alluvial fans and flood plains

This association consists of soils on broad smooth fans and flood plains along the rivers and creeks of the survey area. The soils formed in alluvium washed from weakly consolidated sediment and sandstone of the San Timoteo Badlands. Slopes range from 0 to 15 percent. Elevation ranges from 600 to 2,500 feet, and the average annual rainfall ranges from 10 to 18 inches. The average annual temperature is 61° to 64° F., and the frost-free season is 200 to 280 days.

This association makes up about 6 percent of the survey area. San Emigdio soils make up 45 percent of the association; Grangeville soils, 20 percent; Metz soils, 15 percent; and minor soils, the remaining 20 percent.

San Emigdio soils are well drained. Their surface layer is light brownish-gray, calcareous sandy loam, fine sandy loam, or loam. The substratum is light brownish-gray and light-gray, calcareous, stratified fine sandy loam.

Grangeville soils are moderately well drained to poorly drained. Their surface layer is grayish-brown, moderately alkaline loamy fine sand, sandy loam, or fine sandy loam. The substratum is grayish-brown and light brownish-gray, moderately alkaline to strongly alkaline very fine sandy loam to loamy fine sand. Grangeville soils generally are slightly saline-alkali to strongly saline-alkali. Drainage has been altered, and wetness is no longer a serious hazard.

Metz soils are somewhat excessively drained. Their surface layer is light brownish-gray, mildly alkaline loamy sand, loamy fine sand, or gravelly sandy loam. The underlying material is light brownish-gray and light-gray, mildly alkaline loamy coarse sand and sand.

Minor soils of this association are the Chino, Dello, and Domino, which are in basins where drainage is poor. Other small areas consist of Hanford, Pachappa, and Soboba soils and of the land type Riverwash which are in large drainageways that originate in the granitic uplands.

The soils of this association are used chiefly for grain and pasture. If irrigation water is available, walnuts, apricots, olives, truck crops, alfalfa, and citrus are grown where the climate is suited. The soils are also used for homesites, for commercial centers, and for related community purposes.

8. *Traver-Domino-Willows association*

Moderately well drained to poorly drained, nearly level to gently sloping, saline-alkali soils that have a surface layer of loamy fine sand to silty clay and are moderately deep to very deep to a calcareous hardpan

The soils of this association are in basins and valley fills and on flood plains. They formed in medium-textured alluvium, predominantly granitic in origin. Slopes range from 0 to 5 percent. Elevation ranges from 600 to 1,700 feet, and the average annual rainfall ranges from 10 to 14 inches. The average annual temperature is 61° to 65° F., and the frost-free season is about 210 to 280 days.

This association makes up about 4 percent of the survey area. Traver and Domino soils each make up 30 percent of the association; Willows soils, 20 percent; and minor soils, the remaining 20 percent.

Traver soils are moderately well drained, very deep, and are slightly to moderately saline-alkali. Their surface layer is light brownish-gray and grayish-brown, moderately alkaline loamy fine sand or sandy loam. The subsoil is grayish-brown and light brownish-gray, moderately alkaline and very strongly alkaline fine sandy loam. Below is light brownish-gray, very strongly alkaline loam.

Domino soils are moderately well drained and somewhat poorly drained, and are mostly moderately deep and deep. Their surface layer is grayish-brown, moderately alkaline silt loam or fine sandy loam. It is underlain by light brownish-gray, moderately alkaline heavy silt loam and light silty clay loam. The substratum is a light-gray hardpan that is less cemented with increase in depth.

Willows soils are poorly drained and are moderately deep to very deep. Their surface layer is olive-gray and gray, moderately alkaline silty clay. The substratum is gray and olive-gray, moderately alkaline clay and silty clay. In places a lime-silica cemented hardpan occurs.

Minor soils of this association are the Buchenau, Chino, Fallbrook, Placentia, Porterville, and Waukena.

The moderately to strongly saline-alkali soils of this association are used chiefly for grain and pasture. If irrigation is available, the soils that are slightly saline-alkali and the soils that are not saline-alkali are used for alfalfa, permanent pasture, grain, and truck crops. The soils are also used for duck hunting clubs and other recreation, and for other such community purposes as airports.

Soils of the Southern California Mountains

This physiographic section is made up mainly of large areas of soils on granite and granodiorite, of smaller areas of soils on metamorphic rock and mica-schist, and of very deep soils on small alluvial fans and valley fills. Some of the soils formed in valley fill on recent alluvial fans, and some formed on old alluvial fans. The largest area of soils formed in alluvium is in the Anza Valley and east of this valley at an elevation between 3,900 and 4,500 feet. Some areas of the land types Rough broken land and Gullied land are on the northern and eastern edges of this physiographic section. Elevation ranges from 3,500 to 8,500 feet, and average annual precipitation ranges from about 10 to 30 inches. The average annual temperature is 50° to 59° F., and the frost-free season is about 80 to 160 days. In some places a killing frost may occur any month of the year. The Southern California Mountains are in Land Resource Area 20, which contains two soil associations.

9. *Tollhouse-Sheephead-Crafton association*

Excessively drained to well-drained, gently rolling to steep, shallow to moderately deep soils that have a surface layer of loam; on granitic rock

The soils of this association are on granitic uplands. They are excessively drained to well drained. Slopes range from 5 to 75 percent. The gently rolling to hilly areas are mostly free of rock outcrops, but the hilly to steep areas are rocky. Elevation ranges from 3,500 to 8,500 feet, and the average annual rainfall ranges from 10 to 30 inches. The average annual temperature is 50° to 57° F., and the frost-free season is about 150 to 250 days.

This association makes up about 15 percent of the survey area. Tollhouse soils make up 40 percent of the association; Sheephead soils and Crafton soils, 20 percent each; and minor soils, the remaining 20 percent.

Tollhouse soils are excessively drained and are shallow. Their surface layer is brown, medium acid coarse sandy loam and sandy loam. Their substratum is very pale brown, medium acid coarse sand underlain by medium acid partly weathered granodiorite. Outcrops of rock are common.

Sheephead soils are somewhat excessively drained and are shallow. Their surface layer is dark grayish-brown and brown, neutral fine sandy loam and loam. The substratum is yellowish-brown, slightly acid gravelly coarse sandy loam underlain by decomposing mica-schist that has relic rock structure. In some areas rock crops out and covers 2 to 10 percent of the surface.

Crafton soils are well drained and are moderately deep. Their surface layer is brown to dark-brown and dark yellowish-brown, medium acid sandy loam and stony sandy loam. It is underlain by light yellowish-brown, decomposing metamorphosed, acid, igneous rock. In some areas rocks crop out and cover 2 to 10 percent of the surface.

Minor soils of this association are Bull Trail, Crouch, Mottsville, and Oak Glen, and areas of the miscellaneous land types Gullied land, Rock land, Rough broken land, and Wet alluvial land. Mottsville and Oak Glen soils occur in drainageways, the Bull Trail soils on terraces, and the Crouch soils on uplands. Rock land occurs on the crest of very steep upland slopes.

The soils of this association are used for range. Improved pasture plants are grown where the soils are not rocky or in rolling to hilly areas. The soils are also used for recreation areas and as wildlife habitat.

10. Mottsville-Calpine-Oak Glen association

Excessively drained to well-drained, gently sloping to moderately steep soils that have a surface layer of loamy sand to fine sandy loam; on alluvial fans and valley fill

The soils of this association are on alluvial fans and valley fills. They formed predominantly in material washed from the granitic uplands in the Southern California Mountains. Slopes range from 2 to 25 percent. Elevation ranges from 3,500 to 6,000 feet, and the average annual rainfall ranges from 10 to 25 inches. The average annual temperature is 50° to 57° F., and the frost-free season is about 100 to 225 days.

This association makes up about 4 percent of the survey area. Mottsville soils make up 50 percent of the association; Calpine soils, 25 percent; Oak Glen soils, 15 percent; and minor soils, the remaining 10 percent.

Mottsville soils are excessively drained. Their surface layer is dark grayish-brown, slightly acid loamy sand or sandy loam. The material underlying is grayish-brown, slightly acid loamy coarse sand. In places many cobblestones are on the surface.

Calpine soils are well drained. Their surface layer is brown to dark brown, medium acid sandy loam or loam. The subsoil is dark yellowish-brown, medium acid sandy loam, and it is underlain by yellowish-brown, medium acid loamy coarse sand.

Oak Glen soils are well drained. They have a surface layer of brown, medium acid fine sandy loam or gravelly sandy loam. The underlying material is reddish-brown, medium acid fine sandy loam.

Minor soils in this association are Anza and Bishop, and areas of the miscellaneous land types Riverwash and Wet alluvial land.

The soils of this association are used chiefly for pasture (domestic rye) and grain. If irrigation water is available, apples, pears, peaches, alfalfa seed, and potatoes are grown. The soils are also used for recreation and as wildlife habitat.

Descriptions of the Soils

This section provides detailed information about the soils in the Area. It describes each soil series, and then each soil, or mapping unit. The soils are described in alphabetical order.

The description of a soil series mentions features that apply to all of the soils of that series. Differences among the soils of one series are pointed out in the descriptions of the individual soils, or are apparent in the name.

A profile typical of each series is described in detail in the first mapping unit. This typifying profile is for scientists, engineers, and others who need to make highly technical soil interpretations. The layers, or horizons, are designated by symbols such as A1, B21t, and C1. These symbols have special meaning for soil scientists. Many readers, however, need only remember that symbols beginning with "A" are for surface layer; those with "B" are for subsoil; those with "C" are for substratum, or parent material; and those with "R" are for bedrock. All measurements refer to depth from the surface.

The color of each horizon is described in words, such as yellowish brown, and is also indicated by symbols for hue, value, and chroma, such as 10YR 5/4. These symbols, which are called Munsell color notation, are used by soil scientists to evaluate the color of the soil precisely (*11*)[1]. Unless otherwise stated, all color terms in the survey are for dry soil.

The texture of the soil refers to the content of sand, silt, and clay. It is determined by the way the soil feels when rubbed between the fingers, and it is checked by laboratory analyses. Each mapping unit is identified by a textural class name, such as "fine sandy loam." This name refers to the texture of the surface layer or A horizon.

The structure is indicated by the way the individual soil particles are arranged in larger grains, or aggregates, and the amount of pore space between grains. The structure of the soil is described by terms that denote strength or grade, size, and shape of soil materials, such as "weak, fine, angular blocky structure."

Boundaries between the horizons are described so as to indicate their thickness and shape. The terms for thickness are *abrupt*, *clear*, *gradual*, and *diffuse*. The shape of the boundary is described as *smooth*, *wavy*, *irregular*, or *broken*.

Other terms used for describing the soils are defined in the Glossary. For more general information about the soils, the reader can refer to the section "General Soil Map," in which the broad patterns of soils are described. The approximate acreage and proportionate extent of the soils are given in table 1, and their location and

[1] Italic numbers in parentheses refer to Literature Cited, p. 155.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Acreage	Percent
Altamont clay, 25 to 50 percent slopes	240	([1])
Altamont clay, 5 to 15 percent slopes	240	([1])
Altamont clay, 15 to 25 percent slopes, eroded	340	([1])
Altamont cobbly clay, 8 to 35 percent slopes	860	0.1
Anza fine sandy loam, 2 to 8 percent slopes	400	([1])
Anza loam, 0 to 2 percent slopes	670	.1
Anza loam, 2 to 8 percent slopes	380	([1])
Arbuckle gravelly loam, 2 to 8 percent slopes	3,940	.4
Arbuckle gravelly loam, 8 to 15 percent slopes	1,100	.1
Arbuckle gravelly loam, 15 to 25 percent slopes	260	([1])
Arbuckle loam, 2 to 8 percent slopes	950	.1
Arbuckle loam, 8 to 15 percent slopes	350	([1])
Arbuckle gravelly loam, 2 to 25 percent slopes, severely eroded	360	([1])
Arbuckle gravelly clay loam, 2 to 8 percent slopes	410	([1])
Arlington loam, 2 to 5 percent slopes	2,880	.3
Arlington fine sandy loam, 2 to 8 percent slopes	1,220	.1
Arlington fine sandy loam, 8 to 15 percent slopes	540	([1])
Arlington fine sandy loam, deep, 0 to 2 percent slopes	920	.1
Arlington fine sandy loam, deep, 2 to 8 percent slopes	5,340	.5
Arlington fine sandy loam, deep, 8 to 15 percent slopes	530	.1
Arlington loam, deep, 0 to 5 percent slopes	1,450	.1
Arlington loam, deep, 5 to 15 percent slopes	1,060	.1
Arlington and Greenfield fine sandy loams, 2 to 8 percent slopes, eroded	2,120	.2
Arlington and Greenfield fine sandy loams, 8 to 15 percent slopes, eroded	3,600	.3
Arlington and Greenfield fine sandy loams, 15 to 35 percent slopes, severely eroded	600	.1
Auld clay, 2 to 8 percent slopes	810	.1
Auld clay, 8 to 15 percent slopes	350	([1])
Auld cobbly clay, 8 to 50 percent slopes	510	([1])
Badland	26,110	2.4
Bishop silt loam	2,320	.2
Bonsall fine sandy loam, 2 to 8 percent slopes	1,030	.1
Bonsall fine sandy loam, 8 to 15 percent slopes	230	([1])
Bosanko clay, 2 to 8 percent slopes	880	.1
Bosanko clay, 8 to 15 percent slopes	1,370	.1
Buchenau loam, slightly saline-alkali, 0 to 2 percent slopes	3,900	.4
Buchenau loam, slightly saline-alkali, 2 to 8 percent slopes	710	.1
Buchenau silt loam, 2 to 8 percent slopes, eroded	1,000	.1
Bull Trail sandy loam, 8 to 15 percent slopes, eroded	2,250	.2
Bull Trail sandy loam, 5 to 8 percent slopes, eroded	2,410	.2
Bull Trail sandy loam, 8 to 25 percent slopes, severely eroded	2,050	.2
Bull Trail stony sandy loam, 8 to 15 percent slopes, eroded	880	.1
Bull Trail stony sandy loam, 8 to 25 percent slopes, severely eroded	2,030	1.2
Buren fine sandy loam, 2 to 8 percent slopes, eroded	4,140	.4
Buren fine sandy loam, 8 to 15 percent slopes, eroded	830	.1
Buren loam, 5 to 15 percent slopes, severely eroded	140	([1])
Buren loam, deep, 2 to 8 percent slopes, eroded	970	0.1
Cajalco fine sandy loam, 8 to 15 percent slopes, eroded	7,150	.6
Cajalco fine sandy loam, 2 to 8 percent slopes, eroded	2,660	.2
Cajalco fine sandy loam, 15 to 35 percent slopes, eroded	2,250	.2
Cajalco rocky fine sandy loam, 5 to 15 percent slopes, eroded	1,330	.1
Cajalco rocky fine sandy loam, 15 to 50 percent slopes, eroded	25,000	2.3
Calpine sandy loam, 2 to 8 percent slopes, eroded	4,400	.4
Calpine sandy loam, 8 to 15 percent slopes, eroded	880	.1
Calpine loam, 2 to 8 percent slopes, eroded	480	([1])
Chino silt loam, drained	2,640	.2
Chino silt loam, drained, saline-alkali	2,830	.3
Chino silt loam, strongly saline-alkali	1,240	.1
Cieneba rocky sandy loam, 15 to 50 percent slopes, eroded	117,800	10.6
Cieneba rocky sandy loam, 8 to 15 percent slopes, eroded	6,520	.6
Cieneba sandy loam, 5 to 8 percent slopes	1,650	.1
Cieneba sandy loam, 8 to 15 percent slopes, eroded	4,900	.4
Cieneba sandy loam, 15 to 50 percent slopes, eroded	6,700	.6
Cortina gravelly coarse sandy loam, 2 to 8 percent slopes	1,420	.1
Cortina gravelly loamy sand, 2 to 8 percent slopes	890	.1
Cortina cobbly loamy sand, 2 to 8 percent slopes	800	.1
Cortina sandy loam, 0 to 2 percent slopes	320	([1])
Cortina gravelly sandy loam, 0 to 2 percent slopes	750	.1
Cortina cobbly sandy loam, 2 to 12 percent slopes	700	.1
Crafton rocky sandy loam, 25 to 50 percent slopes, eroded	19,500	1.8
Crafton fine sandy loam, 15 to 35 percent slopes, eroded	300	([1])
Crafton rocky fine sandy loam, 15 to 25 percent slopes	580	.1
Crouch rocky sandy loam, 25 to 50 percent slopes, eroded	1,900	.2
Crouch rocky sandy loam, 8 to 25 percent slopes, eroded	3,460	.3
Crouch loamy sand, 8 to 15 percent slopes, eroded	1,010	.1
Crouch sandy loam, 8 to 15 percent slopes, eroded	2,500	.2
Crouch sandy loam, 15 to 25 percent slopes, eroded	1,460	.1
Delhi fine sand, 2 to 15 percent slopes, wind-eroded	3,180	.3
Delhi loamy fine sand, 0 to 2 percent slopes	1,930	.1
Dello loamy fine sand, 0 to 2 percent slopes	790	.1
Dello loamy sand, 0 to 5 percent slopes	630	.1
Dello loamy sand, poorly drained, 0 to 2 percent slopes	2,010	.2
Dello loamy sand, gravelly substratum, 0 to 5 percent slopes	540	.1
Dello loamy fine sand, saline-alkali, 0 to 5 percent slopes	640	.1
Dello loamy fine sand, gravelly substratum, 0 to 2 percent slopes	1,800	.1

TABLE 1.—*Approximate acreage and proportionate extent of the soils—Continued*

Soil	Acreage	Percent
Domino silt loam, saline-alkali	6,710	0.6
Domino fine sandy loam, eroded	570	.1
Domino fine sandy loam, saline-alkali	1,320	.1
Domino silt loam	1,320	.1
Domino silt loam, strongly saline-alkali	1,570	.1
Escondido fine sandy loam, 8 to 15 percent slopes, eroded	3,930	.4
Escondido fine sandy loam, 2 to 8 percent slopes, eroded	1,740	.1
Escondido fine sandy loam, 15 to 25 percent slopes, eroded	890	.1
Escondido rocky fine sandy loam, 8 to 50 percent slopes, eroded	590	.1
Exeter sandy loam, 0 to 2 percent slopes	3,470	.3
Exeter sandy loam, 2 to 8 percent slopes, eroded	2,000	.2
Exeter sandy loam, slightly saline-alkali, 0 to 5 percent slopes	730	.1
Exeter sandy loam, deep, 0 to 2 percent slopes	3,350	.3
Exeter sandy loam, deep, 2 to 8 percent slopes, eroded	1,320	.1
Exeter very fine sandy loam, 0 to 5 percent slopes	590	.1
Exeter very fine sandy loam, deep, 0 to 5 percent slopes	470	([1])
Fallbrook sandy loam, 8 to 15 percent slopes, eroded	7,000	.6
Fallbrook sandy loam, 15 to 25 percent slopes, eroded	1,300	.1
Fallbrook sandy loam, shallow, 5 to 8 percent slopes, eroded	1,210	.1
Fallbrook sandy loam, shallow, 15 to 35 percent slopes, eroded	2,250	.2
Fallbrook rocky sandy loam, shallow, 8 to 15 percent slopes, eroded	1,360	.1
Fallbrook rocky sandy loam, shallow, 15 to 50 percent slopes, eroded	12,700	1.4
Fallbrook fine sandy loam, 2 to 8 percent slopes, eroded	3,950	.4
Fallbrook fine sandy loam, shallow, 8 to 15 percent slopes, eroded	4,030	.4
Friant rocky fine sandy loam, 25 to 50 percent slopes, eroded	27,800	2.5
Friant rocky fine sandy loam, 8 to 25 percent slopes, eroded	6,640	.6
Friant fine sandy loam, 5 to 25 percent slopes, eroded	2,720	.2
Garretson gravelly very fine sandy loam, 2 to 8 percent slopes	6,950	.6
Garretson very fine sandy loam, 0 to 2 percent slopes	410	([1])
Garretson very fine sandy loam, 2 to 8 percent slopes	4,010	.4
Garretson very fine sandy loam, 8 to 15 percent slopes, eroded	190	([1])
Garretson gravelly very fine sandy loam, 0 to 2 percent slopes	260	([1])
Garretson gravelly very fine sandy loam, 8 to 15 percent slopes, eroded	440	([1])
Gaviota very fine sandy loam, 15 to 50 percent slopes, eroded	610	.1
Gaviota rocky fine sandy loam, 25 to 75 percent slopes, severely eroded	160	([1])
Gaviota rocky very fine sandy loam, 25 to 50 percent slopes, eroded	310	([1])
Gorgonio gravelly loamy fine sand, 2 to 15 percent slopes	8,340	.8
Gorgonio loamy sand, 0 to 8 percent slopes	3,250	.3
Gorgonio loamy sand, 8 to 15 percent slopes	1,540	.1
Gorgonio loamy sand, channeled, 2 to 15 percent slopes	590	.1
Gorgonio loamy sand, deep, 2 to 8 percent slopes	3,020	.3
Gorgonio cobbly loamy fine sand, 2 to 15 percent slopes	2,160	0.2
Grangeville loamy fine sand, drained, 0 to 5 percent slopes	3,270	.3
Grangeville sandy loam, drained, saline-alkali, 0 to 5 percent slopes	800	.1
Grangeville sandy loam, sandy substratum, drained, 0 to 5 percent slopes	770	.1
Grangeville sandy loam, sandy substratum, drained, saline-alkali, 0 to 5 percent slopes	830	.1
Grangeville fine sandy loam, drained, 0 to 2 percent slopes	4,500	.4
Grangeville fine sandy loam, drained, 5 to 15 percent slopes	150	([1])
Grangeville fine sandy loam, poorly drained, saline-alkali, 0 to 5 percent slopes	2,380	.2
Grangeville fine sandy loam, saline-alkali, 0 to 5 percent slopes	2,760	.2
Grangeville fine sandy loam, loamy substratum, drained, 0 to 2 percent slopes	730	.1
Grangeville fine sandy loam, loamy substratum, drained, saline-alkali, 0 to 2 percent slopes	760	.1
Greenfield sandy loam, 2 to 8 percent slopes, eroded	24,000	2.2
Greenfield sandy loam, 0 to 2 percent slopes	10,200	.9
Greenfield sandy loam, 8 to 15 percent slopes, eroded	4,200	.4
Greenfield sandy loam, 15 to 25 percent slopes, eroded	900	.1
Gullied land	20,700	1.9
Hanford coarse sandy loam, 2 to 8 percent slopes	39,500	3.6
Hanford loamy fine sand, 0 to 8 percent slopes	770	.1
Hanford coarse sandy loam, 0 to 2 percent slopes	2,970	.3
Hanford coarse sandy loam, 8 to 15 percent slopes, eroded	10,200	.9
Hanford cobbly coarse sandy loam, 2 to 15 percent slopes, eroded	2,230	.2
Hanford coarse sandy loam, deep, 2 to 8 percent slopes, eroded	450	([1])
Hanford sandy loam, 2 to 15 percent slopes	1,040	.1
Hanford fine sandy loam, 0 to 2 percent slopes	4,500	.4
Hilmar loamy sand, 0 to 2 percent slopes, eroded	1,920	.2
Hilmar loamy very fine sand, 0 to 2 percent slopes	1,800	.2
Hilmar loamy very fine sand, 2 to 8 percent slopes	230	([1])
Honcut sandy loam, 2 to 8 percent slopes	1,520	.1
Honcut sandy loam, 8 to 15 percent slopes, eroded	450	([1])
Honcut loam, 2 to 8 percent slopes, eroded	1,200	.1
Honcut cobbly sandy loam, 2 to 25 percent slopes	200	([1])
Las Posas loam, 8 to 15 percent slopes, eroded	3,700	.3
Las Posas loam, 2 to 8 percent slopes	3,210	.3
Las Posas loam, 5 to 8 percent slopes, eroded	420	([1])
Las Posas loam, 8 to 25 percent slopes, severely eroded	700	.1
Las Posas stony loam, 8 to 15 percent slopes, eroded	260	([1])
Las Posas rocky loam, 8 to 15 percent slopes, eroded	550	([1])
Las Posas rocky loam, 15 to 50 percent slopes, severely eroded	8,320	.8

TABLE 1.—*Approximate acreage and proportionate extent of the soils—Continued*

Soil	Acreage	Percent
Lodo rocky loam, 8 to 25 percent slopes, eroded	4,950	0.4
Lodo rocky loam, 25 to 50 percent slopes, eroded	29,500	2.7
Lodo gravelly loam, 15 to 50 percent slopes, eroded	3,500	.3
Madera fine sandy loam, 0 to 2 percent slopes	1,000	.1
Madera fine sandy loam, 2, to 5 percent slopes, eroded	1,110	.1
Madera fine sandy loam, 5 to 15 percent slopes, eroded	340	([1])
Madera fine sandy loam, shallow, 2 to 8 percent slopes, eroded	1,160	.1
Metz loamy fine sand, 0 to 2 percent slopes	790	.1
Metz loamy fine sand, gravelly sand substratum, 0 to 5 percent slopes	1,750	.1
Metz loamy fine sand, sandy loam substratum, 0 to 5 percent slopes	980	.1
Metz loamy sand, 2 to 8 percent slopes	640	.1
Metz loamy sand, channeled, 0 to 15 percent slopes	1,610	.1
Metz gravelly sandy loam, 2 to 15 percent slopes	1,200	.1
Monserate sandy loam, 5 to 8 percent slopes, eroded	7,000	.6
Monserate sandy loam, 0 to 5 percent slopes	12,000	1.1
Monserate sandy loam, 8 to 15 percent slopes, eroded	3,920	.4
Monserate sandy loam, 15 to 25 percent slopes, severely eroded	700	.1
Monserate sandy loam, shallow, 5 to 15 percent slopes, eroded	2,200	.2
Monserate sandy loam, shallow, 15 to 25 percent slopes, severely eroded	1,880	.2
Mottsville loamy sand, 2 to 8 percent slopes	4,430	.4
Mottsville loamy sand, 8 to 15 percent slopes	3,370	.3
Mottsville cobbly loamy sand, 8 to 25 percent slopes	880	.1
Mottsville sandy loam, 2 to 8 percent slopes	5,020	.5
Mottsville sandy loam, 8 to 15 percent slopes	3,050	.3
Mottsville cobbly sandy loam, 8 to 25 percent slopes, eroded	1,320	.1
Murrieta stony clay loam, 2 to 25 percent slopes	2,350	.2
Oak Glen fine sandy loam, 5 to 15 percent slopes	910	.1
Oak Glen gravelly sandy loam, 8 to 15 percent slopes	1,460	.1
Oak Glen gravelly sandy loam, 15 to 25 percent slopes	860	.1
Pachappa fine sandy loam, 2 to 8 percent slopes, eroded	3,060	.3
Pachappa fine sandy loam, 0 to 2 percent slopes	3,470	.3
Perkins gravelly loam, 5 to 8 percent slopes	560	.1
Perkins gravelly loam, 2 to 5 percent slopes	480	([1])
Perkins loam, 2 to 8 percent slopes	890	.1
Perkins gravelly loam, 8 to 15 percent slopes, eroded	500	([1])
Placentia fine sandy loam, 0 to 5 percent slopes	3,100	.3
Placentia fine sandy loam, 5 to 15 percent slopes	2,600	.2
Placentia cobbly fine sandy loam, 8 to 25 percent slopes	260	([1])
Porterville cobbly clay, 2 to 15 percent slopes	1,050	.1
Porterville clay, 0 to 8 percent slopes	1,040	0.1
Porterville clay, moderately deep, 2 to 8 percent slopes	1,090	.1
Porterville clay, moderately deep, slightly saline-alkali, 0 to 5 percent clopes	1,850	.2
Porterville gravelly clay, moderately deep, 2 to 15 percent slopes, eroded	230	([1])
Ramona sandy loam, 2 to 5 percent slopes, eroded	15,160	1.4
Ramona sandy loam, 0 to 2 percent slopes	4,610	.4
Ramona sandy loam, 0 to 5 percent slopes, severely eroded	4,440	.4
Ramona sandy loam, 5 to 8 percent slopes, eroded	2,820	.3
Ramona sandy loam, 5 to 8 percent slopes, severely eroded	1,270	.1
Ramona sandy loam, 8 to 15 percent slopes, eroded	2,320	.2
Ramona sandy loam, 8 to 15 percent slopes, severely eroded	2,620	.2
Ramona sandy loam, 15 to 25 percent slopes, severely eroded	1,620	.1
Ramona sandy loam, moderately deep, 8 to 15 percent slopes, eroded	670	.1
Ramona sandy loam, moderately deep, 15 to 25 percent slopes, severely eroded	300	([1])
Ramona very fine sandy loam, 0 to 8 percent slopes, eroded	3,070	.3
Ramona very fine sandy loam, moderately deep, 0 to 8 percent slopes, eroded	300	([1])
Ramona and Buren loams, 5 to 15 percent slopes, eroded	480	([1])
Ramona and Buren loams, 5 to 25 percent slopes, severely eroded	2,970	.3
Ramona and Buren sandy loams, 15 to 25 percent slopes, severely eroded	3,560	.3
Riverwash	8,380	.8
Rock land	49,500	4.5
Rough broken land	17,710	1.6
San Emigdio fine sandy loam, 2 to 8 percent slopes, eroded	6,760	.6
San Emigdio fine sandy loam, 0 to 2 percent slopes	7,660	.7
San Emigdio fine sandy loam, 8 to 15 percent slopes, eroded	1,670	.1
San Emigdio fine sandy loam, deep, 0 to 2 percent slopes	3,400	.3
San Emigdio loam, 0 to 2 percent slopes	3,710	.3
San Emigdio loam, 2 to 8 percent slopes	4,670	.4
San Emigdio loam, 8 to 15 percent slopes, eroded	840	.1
San Emigdio sandy loam, channeled, 2 to 15 percent slopes	770	.1
San Timoteo loam, 8 to 25 percent slopes, eroded	4,010	.4
San Timoteo loam, 25 to 50 percent slopes, eroded	6,800	.6
Sheephead rocky fine sandy loam, 15 to 75 percent slopes, eroded	22,000	1.2
Sheephead fine sandy loam, 8 to 15 percent slopes, eroded	950	.1
Soboba stony loamy sand, 2 to 15 percent slopes	2,600	.2
Soboba cobbly loamy sand, 2 to 25 percent slopes	1,470	.1
Soper loam, 15 to 35 percent slopes, eroded	260	([1])
Soper cobbly loam, 25 to 50 percent slopes, eroded	370	([1])
Temescal rocky loam, 15 to 50 percent slopes, eroded	15,800	1.4

TABLE 1.—*Approximate acreage and proportionate extent of the soils*—*Continued*

Soil	Acreage	Percent
Temescal loam, 15 to 50 percent slopes, eroded	290	([1])
Terrace escarpments	28,000	2.5
Tollhouse rocky coarse sandy loam, 8 to 50 percent slopes, eroded	58,700	5.3
Tollhouse sandy loam, 5 to 15 percent slopes, eroded	1,240	.1
Tollhouse sandy loam, 15 to 25 percent slopes, eroded	1,640	.1
Traver loamy fine sand, saline-alkali, eroded	3,340	.3
Traver loamy fine sand, eroded	2,210	.2
Traver fine sandy loam, saline-alkali	1,400	.1
Traver fine sandy loam, strongly saline-alkali, eroded	2,570	.2
Tujunga loamy sand, channeled, 0 to 8 percent slopes	3,600	.3
Tujunga loamy sand, 0 to 5 percent slopes	970	.1
Tujunga gravelly loamy sand, 0 to 8 percent slopes	1,450	.1
Vallecitos loam, 8 to 25 percent slopes, severely eroded	1,370	.1
Vallecitos rocky loam, 8 to 50 percent slopes, eroded	2,810	.3
Vallecitos loam, thick solum variant, 2 to 8 percent slopes, eroded	970	.1
Vallecitos loam, thick solum variant, 8 to 15 percent slopes, eroded	700	.1
Vallecitos loam, thick solum variant, 15 to 50 percent slopes, eroded	520	([1])
Visalia sandy loam, 0 to 8 percent slopes, eroded	540	.1
Visalia fine sandy loam, 0 to 2 percent slopes	350	([1])
Visalia fine sandy loam, 2 to 8 percent slopes	280	([1])
Vista coarse sandy loam, 8 to 15 percent slopes, eroded	9,630	.9
Vista coarse sandy loam, 2 to 8 percent slopes	3,300	.3
Vista coarse sandy loam, 15 to 35 percent slopes, eroded	3,470	0.3
Vista rocky coarse sandy loam, 2 to 35 percent slopes, eroded	5,070	.5
Waukena fine sandy loam, saline-alkali	770	.1
Waukena fine sandy loam, strongly saline-alkali	670	.1
Waukena loam, saline-alkali	810	.1
Waukena loamy fine sand, saline-alkali	1,770	.1
Wet alluvial land	770	.1
Willows silty clay, saline-alkali	3,130	.3
Willows silty clay	2,080	.2
Willows silty clay, strongly saline-alkali	1,310	.1
Willows silty clay, deep, saline-alkali	840	.1
Willows silty clay, deep, strongly saline-alkali	1,270	.1
Wyman loam, 2 to 8 percent slopes, eroded	2,340	.2
Wyman fine sandy loam, 8 to 15 percent slopes, eroded	230	([1])
Yokohl loam, 2 to 8 percent slopes	1,840	.2
Yokohl loam, 8 to 15 percent slopes, eroded	550	([1])
Yokohl loam, 8 to 25 percent slopes, severely eroded	300	([1])
Yokohl cobbly loam, 2 to 25 percent slopes, eroded	330	([1])
Ysidora gravelly very fine sandy loam, 2 to 8 percent slopes, eroded	390	([1])
Ysidora gravelly very fine sandy loam, 8 to 25 percent slopes, eroded	950	.1
Ysidora gravelly very fine sandy loam, 8 to 25 percent slopes, severely eroded	400	([1])
Ysidora very fine sandy loam, 2 to 15 percent slopes, eroded	390	([1])
Quarries and borrow areas	1,460	.1
Water (reservoirs and dams)	5,240	.5
Total	1,105,940	100.0

[1] Less than 0.05 percent.

extent are shown on the detailed soil map at the back of this survey.

Altamont Series

The Altamont series consists of well-drained soils on uplands. Slopes range from 5 to 50 percent. These soils are underlain by soft, fine-grained sandstone and calcareous siltstone. Elevations range from 600 to 1,500 feet. The average annual rainfall ranges from 10 to 14 inches, the average annual temperature ranges from 59° to 63° F., and the average frost-free season is about 280 days. The vegetation is chiefly annual grasses and scrub oaks but includes some coast live oaks.

In a typical profile, the surface layer is grayish-brown clay about 18 inches thick. Underlying this is light brownish-gray heavy clay loam about 5 inches thick. Soft sandstone occurs at a depth of about 23 inches. The reaction ranges from slightly acid to mildly alkaline.

The Altamont soils are near the Gaviota, Vallecitos, thick solum variant, and Soper soils.

The Altamont soils are used for dryland grain, pasture, and range.

Altamont clay, 25 to 50 percent slopes (AaF).—This hilly to steep soil occurs on uplands.

Following is a typical profile on a south-facing slope of 35 percent (1,200 feet west and 500 feet south of the east quarter corner of section 18, T. 3 S., R. 7 W.):

A11—0 to 6 inches, grayish-brown (10YR 5/2) clay, very dark grayish brown (10YR 3/2) when moist; strong, coarse, blocky structure; extremely hard, extremely firm, very sticky and very plastic; abundant very fine and few fine roots; common, very fine, tubular pores; slightly acid (pH 6.1); primary blocks are 12 to 21 inches in diameter; clear, wavy boundary. Horizon is 3 to 6 inches thick.

A12—6 to 11 inches, grayish-brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) when moist; strong, coarse and medium, blocky structure; extremely firm, very sticky and very plastic; plentiful very fine roots; common, fine, tubular pores; many slickensides; neutral (pH 7.0); clear, wavy boundary. Horizon is 5 to 8 inches thick.

A13—11 to 18 inches, grayish-brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) when moist; strong, coarse, blocky structure; extremely hard, extremely firm, very sticky and very plastic; plentiful very fine roots; common, fine, simple, tubular pores; many slickensides about 45 degrees to the vertical; neutral (pH 7.2); clear, irregular boundary. Horizon is 7 to 10 inches thick.

C1—18 to 23 inches, light brownish-gray (10YR 6/2) heavy clay loam, dark grayish brown (10YR 4/2) when

moist; massive; very hard, very firm, sticky and plastic; few very fine roots; few, fine, tubular pores; few slickensides; mildly alkaline (pH 7.5); clear, irregular boundary. Horizon is 5 to 12 inches thick.

C2—23 inches +, brown (10YR 5/3) soft sandstone with white (10YR 8/1) coatings on fracture planes along cracks; slightly acid (pH 6.1).

The A horizon ranges from slightly acid to neutral in reaction, from heavy sandy clay loam to clay in texture, and from grayish brown to dark grayish brown in color. The C1 horizon is mildly alkaline to moderately alkaline and slightly effervescent and is clay loam to clay. The C2 horizon is slightly acid to mildly alkaline, light grayish-brown to brown, decomposing sandstone or siltstone. Depth to sandstone or calcareous siltstone commonly ranges from 20 to 36 inches.

Included with this soil in mapping are small areas of Soper loam and of shallow Gaviota soils having a very fine sandy loam surface layer. Also included are areas with a slightly effervescent surface layer and areas of gray clay soils.

The permeability of this soil is slow, and the available water holding capacity is 3.5 to 5.0 inches. Runoff is rapid, and the hazard of erosion is high. The root zone is 20 to 36 inches deep, and natural fertility is moderate.

This soil is used for dryland pasture and range. (Capability unit VIe-5 (19) dryland; Clayey range site)

Altamont clay, 5 to 15 percent slopes (AaD).—Included with this soil in mapping are small areas of shallow, gravelly clay soils and Altamont soils that have slopes of 2 to 5 percent. Also included are soils that have a slightly effervescent surface layer and that are less than 20 inches deep to sandstone.

Runoff is slow to medium on this soil, and the hazard of erosion is slight to moderate.

This soil is used for dryland grain and pasture. (Capability unit IIIe-5 (19) irrigated; Clayey range site)

Altamont clay, 15 to 25 percent slopes, eroded (AaE2).—Included with this soil in mapping are some areas that have a slightly effervescent surface layer.

Runoff is medium on this soil, and the hazard of erosion is moderate.

This soil is used for dryland grain, pasture, and range. (Capability unit IVe-5 (19) irrigated; Clayey range site)

Altamont cobbly clay, 8 to 35 percent slopes (AbF).—This soil has a profile similar to that described for the Altamont series, but some rounded waterworn cobblestones are on the surface and throughout the profile.

Included with this soil in mapping are small areas having slopes of 2 to 8 percent. Also included are some areas that are severely eroded.

Runoff is medium to rapid on this soil, and the hazard of erosion is moderate to high.

This soil is used for dryland pasture and range. (Capability unit IVe-5 (19) irrigated; Clayey range site)

Anza Series

In the Anza series are moderately well drained soils on alluvial fans and in valley fills. Slopes range from 0 to 8 percent. These soils formed in alluvium from granitic and metamorphic rocks. Elevations range from 3,500 to 5,500 feet. The average annual rainfall ranges from 11 to 16 inches, the average annual temperature ranges from 50° to 57° F., and the average frost-free season is about 175 days. The vegetation is mainly annual grasses and big sagebrush, but oaks or pine trees grow in a few places.

In a typical profile, the surface layer is dark grayish-brown fine sandy loam about 15 inches thick. The subsoil is dark grayish-brown and grayish-brown fine sandy loam that extends to a depth of about 46 inches. The substratum is grayish-brown loamy sand and sandy loam.

The Anza soils are near the Mottsville and Oak Glen soils.

The Anza soils are used for dryland grain, pasture, and range and for irrigated potatoes, apples, and alfalfa.

Anza fine sandy loam, 2 to 8 percent slopes (AcC).—This gently to moderately sloping soil occurs on alluvial fans.

Following is a typical profile on a north-facing slope of 2 percent (approximately 1,100 feet east and 250 feet north of the southwest corner of section 13, T. 7 S., R. 4 E.):

Ap—0 to 15 inches, dark grayish-brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) when moist; weak, fine, crumb and weak, medium, subangular blocky structure; soft, very friable, nonsticky and nonplastic; abundant fine and very fine roots; many, fine, irregular pores; slightly acid (pH 6.5); abrupt, smooth boundary. Horizon is 6 to 15 inches thick.

B21—15 to 23 inches, dark grayish-brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) when moist; weak, coarse, angular blocky structure; slightly hard, friable, nonsticky and slightly plastic; abundant very fine and plentiful fine roots; common, fine, irregular pores; slightly acid (pH 6.5); abrupt, smooth boundary. Horizon is 6 to 10 inches thick.

B22—23 to 36 inches, dark grayish-brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) when moist; moderate, medium, angular blocky structure; slightly hard, friable, nonsticky and slightly plastic; plentiful fine roots; common, fine irregular pores; neutral (pH 7.0); abrupt, wavy boundary. Horizon is 3 to 14 inches thick.

B3—36 to 46 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; massive; hard, friable, nonsticky and nonplastic; few, fine, faint mottles of yellowish brown (10YR 5/4); plentiful fine roots on ped faces; common, medium, irregular pores; moderately alkaline (pH 8.0); gradual, wavy boundary. Horizon is 8 to 12 inches thick.

C1—46 to 57 inches, grayish-brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) when moist; massive; hard, friable, nonsticky and nonplastic; few thin clay films; few, fine, faint yellowish-brown (10YR 5/4) mottles; plentiful fine roots; common, medium, irregular pores; moderately alkaline (pH 8.0); clear, wavy boundary. Horizon is 2 to 11 inches thick.

C2—57 to 69 inches, grayish-brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) when moist; massive; hard, friable, nonsticky and slightly plastic; few thin clay films; few, fine, faint mottles of yellowish brown (10YR 5/4); few fine roots; common medium pores; moderately alkaline (pH 8.0); slight effervescence; abrupt, wavy boundary.

The A horizon is neutral to slightly acid and has a sandy loam, fine sandy loam, or loam texture. The B horizon is 17 to 36 inches thick, neutral to mildly alkaline in reaction, and fine sandy loam to silt loam in texture. The C horizon is slightly to strongly effervescent, stratified loamy sand and sandy loam. Below the C horizon, generally at a depth below 60 inches, a buried soil may occur.

Included with this soil in mapping are small areas of Mottsville loamy sand, Oak Glen fine sandy loam, Calpine sandy loam, and Bull Trail sandy loam. Also included are areas of Anza soils that have slopes of 0 to 2 percent and make up about 10 percent of the total acreage.

The permeability of this soil is moderately rapid, and the available water holding capacity is 7.0 to 9.0 inches. Runoff

is slow to medium, and the hazard of erosion is slight to moderate. The root zone is more than 60 inches deep, and natural fertility is high.

This soil is used for irrigated apples, potatoes, and alfalfa and for dryland grain, pasture, and range. (Capability unit IIe-1 (20) irrigated, IVec-1 (20) dryland; Loamy Uplands range site)

Anza loam, 0 to 2 percent slopes (AdA).—The profile of this soil is similar to that described for the Anza series, but the surface layer is loam about 12 to 16 inches thick. About 8 percent of the total acreage consists of inclusions of a slightly saline-alkali soil along the basin edge.

Runoff is slow on this Anza soil, and the hazard of erosion is slight. The available water holding capacity is 8.0 to 10.0 inches.

This soil is used for irrigated apples, potatoes, and alfalfa and for dryland grain, pasture, and range. (Capability unit I-1 (20) irrigated, IVec-1 (20) dryland; Loamy Uplands range site)

Anza loam, 2 to 8 percent slopes (AdC).—This soil has a profile similar to that described for the Anza series, but the surface layer is a loam about 10 to 14 inches thick. Included in mapping is a small area having a calcareous silt loam substratum.

Runoff is slow to medium on this soil, and the hazard of erosion is slight to moderate.

This soil is used for irrigated apples, potatoes, and alfalfa and for dryland grain, pasture, and range. (Capability unit IIe-1 (20) irrigated, IVec-1 (20) dryland; Loamy Uplands range site)

Arbuckle Series

Soils of the Arbuckle series are well drained and have slopes of 2 to 25 percent. They occur on alluvial fans and developed in alluvium from metasedimentary rocks. Elevations range from 600 to 1,600 feet. The average annual rainfall ranges from 10 to 15 inches, the average annual temperature from 59° to 64° F., and the average frost-free season from 240 to 280 days. Vegetation is chiefly annual grasses, forbs, and chamise.

In a typical profile, the surface layer is brown gravelly loam and pale-brown gravelly very fine sandy loam about 12 inches thick. The subsoil is brown gravelly loam and gravelly clay loam, and it extends to a depth of about 45 inches. The substratum is yellowish-brown very gravelly sandy loam.

The Arbuckle soils are near the Cortina, Garretson, and Perkins soils.

The Arbuckle soils are used for dryland grain and for irrigated citrus, alfalfa, melons, and grain.

Arbuckle gravelly loam, 2 to 8 percent slopes (AlC).—This gently to moderately sloping soil occurs on alluvial fans.

Following is a typical profile on a northwest-facing slope of 4 percent (200 feet south and 800 feet west of the east quarter corner of section 31, T. 3 S., R. 6 W.):

Ap—0 to 6 inches, brown (10YR 5/3) gravelly loam, dark grayish brown (10YR 4/2) when moist; weak, fine, crumb structure; soft, friable, slightly sticky and slightly plastic; abundant very fine roots; many, very fine, irregular pores; slightly acid (pH 6.3); gradual, smooth boundary. Horizon is 4 to 10 inches thick.

A1—6 to 12 inches, pale-brown (10YR 6/3) gravelly very fine sandy loam, brown (10YR 4/3) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; plentiful very fine roots; common, very fine, irregular pores; neutral (pH 6.8); gradual, smooth boundary. Horizon is 4 to 14 inches thick.

B1—12 to 26 inches, brown (10YR 5/3) gravelly loam, brown 10YR 4/3) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; plentiful very fine roots; common, very fine, tubular pores; mildly alkaline (pH 7.8); clear, smooth boundary. Horizon is 3 to 18 inches thick.

B21t—26 to 30 inches, brown (10YR 5/3) gravelly clay loam, brown (10YR 4/3) when moist; moderate, medium, subangular blocky structure; slightly hard, firm, sticky and plastic; plentiful very fine roots; common, very fine, tubular pores; weak thin clay films on ped faces; mildly alkaline (pH 7.5); clear, smooth boundary. Horizon is 6 to 15 inches thick.

B22t—30 to 45 inches, brown (10YR 5/3) gravelly clay loam, brown (10YR 4/3) when moist; massive; slightly hard, firm, sticky and plastic; plentiful very fine roots; common, very fine, tubular pores; weak thin clay films in tubular pores; mildly alkaline (pH 7.5); clear, smooth boundary. Horizon is 4 to 20 inches thick.

C—45 to 68 inches, yellowish-brown (10YR 5/4) very gravelly sandy loam, brown (10YR 4/3) when moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many, very fine, tubular pores; neutral (pH 7.0).

The A horizon is slightly acid to neutral. The Bt horizon ranges from neutral to mildly alkaline gravelly loam to gravelly clay loam. The C horizon is gravelly to very gravelly sandy loam.

Included with this soil in mapping are small areas of Garretson gravelly very fine sandy loam and Perkins gravelly loam.

This soil has moderately slow permeability, and its available water holding capacity is 6.0 to 8.0 inches. Runoff is slow to medium, and the hazard of erosion is slight to moderate. The root zone is more than 60 inches deep, and natural fertility is moderate.

This Arbuckle soil is used for irrigated citrus, alfalfa, melons, and grain and for dryland grain and pasture. (Capability unit IIe-1 (19) irrigated; Loamy range site)

Arbuckle gravelly loam, 8 to 15 percent slopes (AlD).—Included with this soil in mapping are very small areas that have a gravelly very fine sandy loam surface layer and a gravelly loam subsoil. Runoff is medium on this soil, and the hazard of erosion is moderate.

This soil is used for irrigated citrus and grain and for dryland grain, pasture, and range. (Capability unit IIIe-1 (19) irrigated; Loamy range site)

Arbuckle gravelly loam, 15 to 25 percent slopes (AlE).—Included with this soil in mapping is a small area that has a gravelly fine sandy loam surface layer. Runoff is rapid on this soil, and the hazard of erosion is high.

This soil is used for irrigated grain and citrus and for dryland pasture and range. (Capability unit IVe-1 (19) irrigated; Loamy range site)

Arbuckle loam, 2 to 8 percent slopes (AkC).—The profile of this soil is similar to that described for the Arbuckle series, but it does not contain gravel in the surface layer and subsoil, and it has a subsoil of loam or clay loam. Included with this soil in mapping are some nearly level areas and a small area with a fine sandy loam surface layer.

The available water holding capacity of this soil is 9.0 to 11.0 inches.

This soil is used for irrigated citrus, alfalfa, melons, and grain and for dryland grain, pasture, and range. (Capability unit IIe-1 (19) irrigated; Loamy range site)

Arbuckle loam, 8 to 15 percent slopes (AkD).—This soil has a profile similar to that described for the Arbuckle series, but it does not contain gravel in the surface layer and subsoil. A few small areas that have a fine sandy loam surface layer and a loam subsoil are included with this soil in mapping.

The available water holding capacity of this soil is 9.0 to 11.0 inches. Runoff is medium, and the hazard of erosion is moderate.

This soil is used for irrigated citrus and grain and for dryland pasture and range. (Capability unit IIIe-1 (19) irrigated; Loamy range site)

Arbuckle gravelly loam, 2 to 25 percent slopes, severely eroded (AlE3).—This soil occurs along major drainageways. Most of the surface layer and some of the subsoil have been removed through erosion. Gullies are deep and so numerous that they cannot be crossed by farm implements.

Runoff is rapid, and the hazard of erosion is high.

This soil has a brush cover and is not suited to cultivation. It is commonly used for pasture, range, and watershed. Some areas are idle. (Capability unit VIe-1 (19) dryland; Shallow Loamy range site)

Arbuckle gravelly clay loam, 2 to 8 percent slopes (AmC).—The profile of this soil is similar to that described for the Arbuckle series, but it has a gravelly clay loam surface layer and a slightly heavier gravelly clay loam subsoil that contains more clay than the surface layer. Included with this soil in mapping are a few small areas with a clay texture throughout the profile.

Runoff is slow to medium on this soil, and the hazard of erosion is slight to moderate.

This soil is used for irrigated citrus, alfalfa, grain, and melons and for dryland grain, pasture, and range. (Capability unit IIe-1 (19) irrigated; Loamy range site)

Arlington Series

The Arlington series consists of well-drained soils on alluvial fans and terraces. Slopes range from 0 to 35 percent, but most slopes are less than 15 percent. These soils developed in alluvium, dominantly from granitic rocks. Elevations range from 500 to 2,000 feet. The average annual rainfall ranges from 10 to 15 inches, the average annual temperature from 61° to 64° F., and the average frost-free season from 240 to 300 days. The vegetation is chiefly annual grasses, forbs, and chamise.

In a typical profile, the surface layer is brown loam about 7 inches thick. The subsoil is brown and reddish-brown loam about 17 inches thick. Underlying the subsoil is weakly cemented alluvium.

The Arlington soils are near the Hanford, Greenfield, Ramona, and Buren soils.

Arlington soils are used for dryland grain, pasture, and range and for irrigated citrus, truck crops, and grain. They are also used for nonfarm purposes.

Arlington loam, 2 to 5 percent slopes (ApB).—This gently sloping soil occurs on terraces.

Following is a typical profile on a north-facing slope of 2 percent (1,050 feet south and 1,100 feet east of the west quarter corner of section 2, T. 3 S., R. 5 W.):

Ap—0 to 7 inches, brown (10YR 5/3) loam, dark brown (10YR 3/3) when moist; weak, fine, granular structure; hard, friable, slightly sticky and nonplastic; abundant very fine roots; many, fine and very fine, tubular pores; neutral (pH 7.3); clear, wavy boundary. Horizon is 4 to 9 inches thick.

B1t—7 to 11 inches, brown (7.5YR 5/4) loam, reddish brown (5YR 4/3) when moist; massive; hard, friable, slightly sticky and nonplastic; abundant very fine roots; many, fine and very fine, tubular pores; mildly alkaline (pH 7.5); gradual, smooth boundary. Horizon is 4 to 8 inches thick.

B21t—11 to 17 inches, reddish-brown (5YR 5/4) loam, dark reddish brown (5YR 3/4) when moist; moderate, fine, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; abundant fine and coarse roots; common, fine and medium, tubular pores; few thin clay films on ped faces and in pores; mildly alkaline (pH 7.8); gradual, smooth boundary. Horizon is 6 to 13 inches thick.

B22t—17 to 21 inches, reddish-brown (5YR 5/3) loam, reddish brown (5YR 4/3) when moist; strong, fine, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; plentiful very fine and coarse roots; common, fine and very fine, tubular pores; few thin clay films on ped faces and in pores; mildly alkaline (pH 7.8); slightly effervescent; lime segregated in fine soft masses; gradual, wavy boundary. Horizon is 4 to 10 inches thick.

B3t—21 to 24 inches, reddish-brown (5YR 5/4) loam, dark reddish brown (5YR 3/4) when moist; massive; hard, friable, slightly sticky and slightly plastic; few fine and coarse roots; common, very fine, tubular pores; few thin clay films in bridges and pores; mildly alkaline (pH 7.5); slightly effervescent; lime segregated in fine soft masses; abrupt, wavy boundary. Horizon is 3 to 14 inches thick.

C1si—24 to 36 inches, brown (10YR 5/3) weakly cemented sandy loam, brown (10YR 4/3) when moist; very coarse prismatic structure; very hard, firm, nonsticky and nonplastic; common, microtubular pores; mildly alkaline (pH 7.5); strongly effervescent in fine seams between structural units; light-gray (10YR 7/2) siliceous coatings on the surface of the prisms, which resist decomposition by water or acid; clear, wavy to irregular boundary. Horizon is 4 to 12 inches thick.

C2—36 to 60 inches, brown (10YR 5/3) loamy coarse sand, brown (10YR 4/3) when moist; massive; neutral (pH 7.0).

The A horizon is slightly acid to mildly alkaline. The Bt horizon is neutral to mildly alkaline, brown to reddish-brown very fine sandy loam to loam. Depth to the weakly cemented pan commonly ranges from 20 to 36 inches.

Included with this soil in mapping are small areas of Hanford sandy loam, Greenfield sandy loam, Ramona sandy loam, and Buren fine sandy loam. Also included are some eroded areas and some nearly level areas.

Permeability of this soil is slow, and the available water holding capacity is 3.75 to 5.0 inches. Runoff is slow to medium, and the hazard of erosion is slight to moderate. The natural fertility is medium.

This Arlington soil is used for dryland grain and pasture, for irrigated citrus and truck crops, and for nonfarm purposes. (Capability unit IIIe-8 (19) irrigated; Loamy range site)

Arlington fine sandy loam, 2 to 8 percent slopes (AnC).—The profile of this soil is similar to that described for the Arlington series, but it has a fine sandy loam surface layer 6 to 10 inches thick.

A small area of severely eroded Arlington fine sandy loam is included with this soil in mapping.

This soil is used for irrigated citrus, grain, and truck crops, for dryland grain, pasture, and range, and for nonfarm purposes. (Capability unit IIIe-8 (19) irrigated; Loamy range site)

Arlington fine sandy loam, 8 to 15 percent slopes (AnD).—The profile of this soil is similar to that described for the Arlington series, but it has a fine sandy loam surface layer.

Small areas of soils occurring on slopes of 15 to 25 percent are included. Also included are severely eroded areas, which make up about 25 percent of the total acreage.

Runoff is medium, and the hazard of erosion is moderate.

This soil is used for irrigated citrus and truck crops, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IVe-8 (19) irrigated; Loamy range site)

Arlington fine sandy loam, deep, 0 to 2 percent slopes (AoA).—The profile of this soil is similar to that described for the Arlington series, but it is deep over the weakly cemented layer and has a fine sandy loam surface layer 8 to 14 inches thick. Included in this mapping unit are areas having slightly more clay in the subsoil than normal for Arlington soils.

The available water holding capacity of this soil is 6.0 to 7.0 inches. Runoff is slow, and the hazard of erosion is slight. The root zone is 36 to 54 inches deep.

This soil is used for irrigated citrus, truck crops, and grain, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IIs-8 (19) irrigated; Loamy range site)

Arlington fine sandy loam, deep, 2 to 8 percent slopes (AoC).—The profile of this soil is similar to that described for the Arlington series, but it is deep over the weakly cemented layer and has a fine sandy loam surface layer 6 to 12 inches thick.

Approximately 10 percent of the acreage mapped as this soil consists of included small areas where the subsoil contains slightly more clay than normal. Also included are a few small areas that have a water table at a depth of 36 to 60 inches.

The available water holding capacity of this soil is 6.0 to 7.0 inches. Runoff is medium, and the hazard of erosion is moderate. The root zone is 36 to 54 inches deep.

This soil is used for irrigated citrus, truck crops, and grain, for dryland grain, pasture, and range, and for nonfarm purposes. (Capability unit IIIe-1 (19) irrigated; Loamy range site)

Arlington fine sandy loam, deep, 8 to 15 percent slopes (AoD).—The profile of this soil is similar to that described for the Arlington series, but it is deep over the weakly cemented layer and has a fine sandy loam surface layer 8 to 12 inches thick. A few small areas with a slight increase of clay in the subsoil are included in mapping.

The available water holding capacity of this soil is 6.0 to 7.0 inches. Runoff is medium, and the hazard of erosion is moderate. The root zone is 36 to 54 inches deep.

This soil is used for irrigated citrus and grain, for dryland grain, pasture, and range, and for nonfarm purposes. (Capability unit IVe-1 (19) irrigated; Loamy range site)

Arlington loam, deep, 0 to 5 percent slopes (ArB).—The profile of this soil is similar to that described for the Arlington series, but it is deep over the weakly cemented layer.

The available water holding capacity is 7 to 9 inches. The root zone is 36 to 54 inches deep.

This soil is used for irrigated citrus, truck crops, and grain, for dryland pasture, grain, and range, and for nonfarm purposes. (Capability unit IIe-1 (19) irrigated; Loamy range site)

Arlington loam, deep, 5 to 15 percent slopes (ArD).—The profile of this soil is similar to that described for the Arlington series, but it is deep over the weakly cemented layer. Included with this soil in mapping are a few small areas of moderately deep soils and a small area having slopes of 15 to 25 percent.

The available water holding capacity of this soil is 7 to 9 inches. Runoff is medium, and the hazard of erosion is moderate. The root zone is 36 to 54 inches deep.

This soil is used for irrigated citrus and grain, for dryland grain, pasture, and range, and for nonfarm purposes. (Capability unit IIIe-1 (19) irrigated; Loamy range site)

Arlington and Greenfield fine sandy loams, 2 to 8 percent slopes, eroded (AtC2).—This mapping unit consists of an undifferentiated group of soils on top of convex terraces, on ridges, and in concave areas where dissected terraces and alluvial fans merge. About 45 percent of the acreage is Arlington fine sandy loam; about 40 percent, Greenfield fine sandy loam; 10 percent, included areas of Greenfield cobbly and gravelly fine sandy loams; and 5 percent, included areas of severely eroded Arlington and Greenfield soils.

The Arlington soil of this mapping unit has a profile similar to that described for the Arlington series, but its surface layer is fine sandy loam. In areas of Arlington soil, there are rills and a few shallow gullies. The Greenfield soil of this mapping unit has a profile similar to that described for the Greenfield series, but its surface layer is fine sandy loam.

The soils in this group are used for dryland grain in the area east of Temesula and Murrieta. (Both soils, capability unit IIIe–8 (19) irrigated; Loamy range site)

Arlington and Greenfield fine sandy loams, 8 to 15 percent slopes, eroded (AtD2).—This mapping unit consists of an undifferentiated group of soils on top of convex terraces, on ridges, and in concave areas where dissected terraces and alluvial fans meet. About 35 percent of the acreage is Arlington fine sandy loam; 35 percent, Greenfield fine sandy loam; 10 percent, included areas of Greenfield cobbly and gravelly fine sandy loams; and 20 percent, included areas of severely eroded Arlington and Greenfield soils.

The Arlington soil of this mapping unit has a profile similar to that described for the Arlington series, but its surface layer is fine sandy loam and is eroded. The Greenfield soil of this mapping unit has a profile similar to that described for the Greenfield series, but its surface layer is fine sandy loam.

Runoff is medium on these soils, and the hazard of erosion is moderate.

The soils in this group are used for dryfarmed grain. (Both soils, capability unit IVe-8 (19) irrigated; Loamy range site)

Arlington and Greenfield fine sandy loams, 15 to 35 percent slopes, severely eroded (AtF3).—This mapping unit consists of an undifferentiated group of soils on top of convex terraces, on ridges, and in concave areas where dissected terraces and alluvial fans meet. Shallow to deep gullies occur, and in places the subsoil is exposed. About 55 percent of the acreage is Arlington fine sandy loam, and 45 percent, Greenfield fine sandy loam.

The Arlington soil of this mapping unit has a profile similar to that described for the Arlington series, but its surface layer is fine sandy loam 0 to 6 inches thick. The available water holding capacity of this soil is 2.0 to 4.5 inches. The root zone is 15 to 26 inches deep. The Greenfield soil of this unit has a profile similar to that described for the Greenfield series, but its surface layer is fine sandy loam 0 to 8 inches thick.

Runoff is rapid to very rapid, and the hazard of erosion is high to very high.

The soils in this group are used for dryland pasture. (Arlington soil, capability unit VIe-8 (19) dryland; Greenfield soil, capability unit VIe-1 (19) dryland; both soils, Loamy range site)

Auld Series

In the Auld series are well-drained soils that developed on decomposing gabbro. These soils are on uplands and have slopes of 2 to 50 percent. Elevations range from 1,400 to 2,700 feet. The average annual rainfall ranges from 10 to 15 inches, the average annual temperature from 59° to 64° F., and the average frost-free season from 200 to 250 days. Vegetation is chiefly annual grasses, forbs, and black sage.

In a typical profile, the surface layer is reddish-brown and dark reddish-brown clay about 28 inches thick. Beneath this is reddish-brown and light reddish-brown loam. At a depth of about 44 inches is weathered basic igneous rock.

The Auld soils are near the Cajalco and Las Posas soils. They are used for dryland grain, pasture, and range.

Auld clay, 2 to 8 percent slopes (AuC).—This gently sloping soil occurs on uplands.

Following is a typical profile on a northwest-facing slope of 4 percent (1,050 feet east and 1,180 feet south of the west quarter corner of section 29, T. 6 S., R. 2 W.):

Ap1—0 to 3 inches, reddish-brown (5YR 4/3) clay, dark reddish brown (5YR 3/4) when moist; strong, medium, granular structure; very hard, very firm, sticky and plastic; abundant very fine roots; common, very fine, irregular pores; neutral (pH 7.0); clear, smooth boundary. Horizon is 3 to 12 inches thick.

Ap2—3 to 8 inches, dark reddish-brown (5YR 3/3) clay, dark reddish brown (2.5YR 3/4) when moist; strong, medium, angular blocky structure; very hard, very firm, sticky and very plastic; abundant very fine roots; common, very fine, irregular pores; neutral (pH 7.0); clear, wavy boundary. Horizon is 5 to 11 inches thick.

A11—8 to 15 inches, dark reddish-brown (5YR 3/3) clay, dark reddish brown (2.5YR 3/4) when moist; strong, coarse, angular blocky structure; very hard, extremely firm, very sticky and very plastic; abundant very fine roots; common, very fine, tubular pores; prominent slickensides; mildly alkaline (pH 7.8); clear, wavy boundary. Horizon is 5 to 18 inches thick.

A12—15 to 23 inches, dark reddish-brown (5YR 3/4) clay, dark reddish brown (2.5YR 3/4) when moist; strong, coarse, angular blocky structure; very hard, very firm, sticky and plastic; abundant very fine exped roots (flattened); common, very fine, tubular pores; many prominent slickensides; moderately alkaline (pH 8.0); strongly effervescent; lime segregated in many fine rounded soft masses; gradual, wavy boundary. Horizon is 4 to 9 inches thick.

A13—23 to 28 inches, dark reddish-brown (5YR 3/4) clay, dark reddish brown (2.5YR 3/4) when moist; massive; very hard, very firm, sticky and plastic; few very fine exped roots; many, very fine, tubular pores; many prominent slickensides; moderately alkaline (pH 8.0); strongly effervescent; lime segregated in many fine rounded soft masses; clear, irregular boundary. Horizon is 6 to 24 inches thick.

C1—28 to 38 inches, reddish-brown (5YR 5/3) heavy loam, reddish brown (5YR 4/3) when moist; massive; hard, friable, slightly sticky and slightly plastic; few, very fine, tubular pores; moderately alkaline (pH 8.2); strongly effervescent; lime segregated in many fine soft masses; clear, irregular boundary. Horizon is 4 to 12 inches thick.

C2—38 to 44 inches, reddish-brown (5YR 5/3) and light reddish-brown (5YR 6/3) loam; massive; slightly hard, very friable, slightly sticky and slightly plastic; moderately alkaline (pH 8.2); strongly effervescent; lime in many medium irregular soft masses; abrupt, wavy boundary. Horizon is 4 to 12 inches thick.

C3—44 to 60 inches, light reddish-brown (5YR 6/3) and white (10YR 8/1), weathered, basic igneous rock containing large pockets of lime in soft masses; strongly effervescent; moderately alkaline (pH 8.2).

The A horizon is neutral to moderately alkaline heavy clay loam to clay. The C horizon is moderately to strongly effervescent loam to heavy loam. Depth to the decomposing gabbro commonly ranges from 30 to more than 60 inches.

Included with this soil in mapping are small areas of Cajalco fine sandy loam, Las Posas loam, and Temescal rocky loam.

The permeability of this soil is moderately slow, and the available water holding capacity is 5.0 to 8.0 inches. Runoff is slow to medium, and the hazard of erosion is slight to moderate. The root zone is 30 to more than 60 inches deep, and natural fertility is high.

This Auld soil is used for dryland pasture, grain, and range. (Capability unit IIe-5 (19) irrigated; Clayey range site)

Auld clay, 8 to 15 percent slopes (AuD).—Included with this soil in mapping are a few small areas that have slopes of 15 to 25 percent, some areas of Auld gravelly clay, and some areas of very deep Auld gravelly clay.

Runoff is medium on this soil, and the hazard of erosion is moderate.

This soil is used for dryland pasture, grain, and range. (Capability unit IIIe-5 (19) irrigated; Clayey range site)

Auld cobbly clay, 8 to 50 percent slopes (AyF).—The profile of this soil is similar to that described for the Auld series, but cobblestones are on the surface and throughout the profile. Included with this soil in mapping is a small area having slopes of 2 to 8 percent. Also included are some small areas of Auld clay or gravelly clay.

Runoff is medium to rapid, and the hazard of erosion is moderate to high. The available water holding capacity is 3.0 to 5.0 inches. Natural fertility is low to moderate.

This soil is used for dryland pasture and range. (Capability unit VIe-5 (19) dryland; Clayey range site)

Badland (BaG) consists of acid igneous alluvium that originally was deposited in an inland sea. The area was elevated above the water, was deformed by geologic processes, and then was severely eroded and dissected by drainageways. The original landform has been destroyed. Slopes range from 30 to 70 percent.

This land is variable and consists of soft sandstone,

arkose, siltstone, and beds of gravel. This material is semiconsolidated and ranges from light gray through grayish brown to brown. It ranges from moderately alkaline to strongly alkaline and is moderately or strongly effervescent.

Vegetation consists mainly of forbs and brush in extremely sparse stands. Where this land is near areas of cropland, it provides a habitat for small game, particularly rabbits, doves, and quail. The main uses of this land are for wildlife habitat and as a source of water. (Capability unit VIIIe-1 (19, 20) dryland; range site not assigned)

Bishop Series

The Bishop series consists of poorly drained soils on flood plains and alluvial fans. These soils developed in alluvium from granitic rock. Slopes are 0 to 2 percent. Elevations range from 3,500 to 4,200 feet. The average annual rainfall ranges from 13 to 17 inches, the average annual temperature from 52° to 56° F., and the average frost-free season from 120 to 160 days.

In a typical profile, the surface layer is gray silt loam about 14 inches thick. The substratum is gray, olive-gray, and grayish-brown stratified fine sandy loam, sandy clay loam, and silty clay loam. The soil is generally moderately to strongly saline-alkali.

The Bishop soils are near the Bull Trail, Oak Glen, and Mottsville soils.

The Bishop soils are used for dryland pasture and range and for irrigated potatoes.

Bishop silt loam (0 to 2 percent slopes) **(Bb)**—This soil occurs on flood plains and alluvial fans. It is moderately to strongly saline-alkali.

Following is a typical profile on a southwest-facing slope of 2 percent (1,050 feet east and 100 feet north of the southwest corner of section 29, T. 7 S., R. 2 E.):

A11—0 to 7 inches, gray (10YR 5/1) silt loam, black (10YR 2/1) when moist; moderate, fine, granular structure; slightly hard, very friable, nonsticky and slightly plastic; plentiful fine roots and abundant very fine roots; many, very fine and fine, irregular pores; moderately alkaline (pH 8.0); strongly effervescent; clear, smooth boundary. Horizon is 2 to 8 inches thick.

A12—7 to 14 inches, gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) when moist; weak, fine and medium, subangular blocky structure that parts to moderate, fine, granular structure; hard, friable, slightly sticky and slightly plastic; plentiful fine roots and abundant very fine roots; common, fine, tubular and irregular pores; moderately alkaline (pH 8.0); strongly effervescent; clear, smooth boundary. Horizon is 5 to 12 inches thick.

C1—14 to 26 inches, gray (5Y 5/1) fine sandy loam; few, faint, olive (5Y 5/3) mottles, very dark gray (5Y 3/1) when moist; moderate, medium, subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; plentiful very fine roots and few fine roots; few, fine, and common, very fine, tubular pores; few thin clay films line tubular pores; moderately alkaline (pH 8.2); strongly effervescent; gradual, smooth boundary. Horizon is 8 to 14 inches thick.

C2g—26 to 32 inches, olive-gray (5Y 5/2) fine sandy loam, olive gray (5Y 4/2) when moist; weak, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few, fine and very fine roots; few, very fine, tubular pores; moderately alkaline (pH 8.2); strongly effervescent; abrupt, smooth boundary. Horizon is 6 to 12 inches thick.

C3ca—32 to 52 inches, gray (5Y 6/1) silty clay loam, dark gray (5Y 4/1) when moist; massive; hard, firm, sticky and plastic; moderately alkaline (pH 8.2); violently effervescent; clear, smooth boundary. Horizon is 12 to 20 inches thick.

C4—52 to 64 inches, grayish-brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) when moist; massive; hard, firm, sticky and plastic; moderately alkaline (pH 8.2); very slightly effervescent.

The A horizon is slightly to strongly effervescent. It ranges from very dark gray to light gray in color and from silty clay loam to silt loam in texture. The C horizon ranges from fine sandy loam to silty clay loam in texture. In about 40 percent of the areas mapped, the water table is within 20 inches of the surface soil. Irrigation wells are lowering the water table.

Included with this soil in mapping are small areas of Calpine sandy loam, Oak Glen fine sandy loam, Mottsville sandy loam, and Mottsville loamy sand. Also included are small areas of erosion and deposition and areas that are somewhat poorly drained and only slightly saline-alkali.

Permeability of this soil is moderate to moderately slow, and available water holding capacity is 9.0 to 10.0 inches. Runoff is ponded, and there is no erosion hazard. The root zone is more than 60 inches deep, except where it is limited by the water table. Natural fertility is moderate.

This soil is used for dryland pasture and range and for irrigated potatoes. (Capability unit VIw-1 (20) dryland; Cienega range site)

Bonsall Series

Soils of the Bonsall series have developed in material deeply weathered from granodiorite or tonalite. These moderately well drained soils occur on uplands and have slopes of 2 to 15 percent. Elevations range from 1,000 to 1,800 feet. The average annual rainfall ranges from 10 to 14 inches, the average annual temperature from 62° to 65° F., and the average frost-free season from 240 to 300 days. The vegetation is chiefly annual grasses, forbs, and chamise.

Typically, the surface layer is brown fine sandy loam and loam about 9 inches thick. The subsoil is reddish-brown and dark reddish-brown clay loam and clay and yellowish-brown sandy clay. At a depth of about 30 inches is decomposing tonalite.

The Bonsall soils are near the Cieneba, Fallbrook, Vista, and Monserate soils.

The Bonsall soils are used for dryland hay, grain, pasture, and range, for irrigated citrus, and for nonfarm purposes.

Bonsall fine sandy loam, 2 to 8 percent slopes (BdC).—This undulating to gently rolling soil occurs on uplands.

Following is a typical profile on an east-facing slope of 4 percent (900 feet east and 700 feet south of the north quarter corner of section 19, T. 3 S., R. 4 W.):

Ap—0 to 5 inches, brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) when moist; weak, fine, granular structure; soft, very friable, slightly sticky and slightly plastic; abundant, very fine, random roots; many, very fine and few, fine, irregular pores; medium acid (pH 6.0); abrupt, wavy boundary. Horizon is 5 to 6 inches thick.

A1—5 to 9 inches, brown (7.5YR 5/4) loam, dark brown (7.5YR 3/2) when moist; weak, medium, granular structure; soft, very friable, slightly sticky and slightly plastic; plentiful, very fine, random roots; many, very fine and fine, tubular pores;

medium acid (pH 6.0); abrupt, smooth boundary. Horizon is 4 to 8 inches thick.

B1—9 to 13 inches, reddish-brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) when moist; strong, medium, prismatic structure; hard, friable, sticky and plastic; plentiful, very fine, random roots; many, very fine and common, fine, tubular pores; few thin clay films in pores and bridges; medium acid (pH 6.0); abrupt, wavy boundary. Horizon is 4 to 8 inches thick.

B21t—13 to 21 inches, dark reddish-brown (5YR 3/4) clay, dark reddish brown (5YR 3/3) when moist; strong, coarse, prismatic and strong, coarse, subangular blocky structure; extremely hard, extremely firm, very sticky and very plastic; many very fine exped roots; common, very fine, tubular pores; continuous thick clay films on ped faces; neutral (pH 7.0); clear, irregular boundary. Horizon is 4 to 8 inches thick.

B22t—21 to 25 inches, reddish-brown (5YR 4/4) clay, reddish brown (5YR 4/3) when moist; strong, moderate, subangular blocky structure; extremely hard, extremely firm, very sticky and very plastic; few very fine, exped roots; common, very fine, tubular pores; many thick continuous clay films on ped faces; mildly alkaline (pH 7.5); abrupt, irregular boundary. Horizon is 4 to 8 inches thick.

B3tca—25 to 30 inches, yellowish-brown (10YR 5/4) sandy clay, dark yellowish brown (10YR 4/4) when moist; massive; extremely hard, extremely firm, very sticky and very plastic; very few, very fine roots; very few, very fine, tubular pores; patchy clay films in pores; moderately alkaline (pH 8.0); slightly effervescent; lime in seams; gradual, irregular boundary. Horizon is 5 to 18 inches thick.

Cca—30 to 53 inches, decomposing tonalite and coarse clayey sand; salt and pepper appearance; quartz granules, reddish yellow (5YR 7/6), (5YR 6/6 when moist); finer textured material between the quartz granules is reddish brown (5YR 4/3), (5YR 4/4 when moist); massive; very hard, firm, slightly sticky and nonplastic; few fine roots; few, very fine, irregular pores; moderately alkaline (pH 8.0); violently effervescent; fracture planes have a coating of lime; mica flakes prominent.

The A horizon is fine sandy loam to loam in texture. The Bt horizon is neutral to moderately alkaline in reaction and reddish brown to dark reddish brown to yellowish brown in color. Textures range from clay loam in the B1 horizon to clay or sandy clay in the B2t and B3t horizons. The B3t horizon is calcareous and has a high sodium saturation. The C horizon is reddish-yellow to reddish-brown decomposing tonalite or granodiorite and is strongly to violently effervescent. Depth to decomposing tonalite or granodiorite commonly ranges from 27 to 54 inches.

Included with this soil in mapping are small areas of Vista coarse sandy loam, Fallbrook sandy loam, Cieneba sandy loam, and Monserate sandy loam. Also included are small areas of Bonsall soils in which the root zone is 22 to 36 inches deep.

Permeability of this soil is very slow, and the available water holding capacity is 2.2 to 4.0 inches. Runoff is slow to medium, and the hazard of erosion is slight to moderate. The clay subsoil limits the root zone, which is 12 to 24 inches deep. Natural fertility is low.

This Bonsall soil is used for dryland hay, grain, and pasture, for irrigated citrus, and for homesites. (Capability unit IVe-3 (19) irrigated; Claypan range site)

Bonsall fine sandy loam, 8 to 15 percent slopes (BdD).—Included with this soil in mapping are small areas with a root zone 22 to 36 inches deep. Also included are Bonsall soils that have slopes of 15 to 25 percent.

Runoff is medium on this soil, and the hazard of erosion is high.

This soil is used for dryland pasture, hay, and grain, for irrigated citrus, and for homesites. (Capability unit IVe-3 (19) irrigated; Claypan range site)

Bosanko Series

In the Bosanko series are well-drained soils that have slopes of 2 to 15 percent. These upland soils developed in light-colored, acid igneous rocks. Elevations range from 1,500 to 2,600 feet. The average annual rainfall ranges from 10 to 16 inches, the average annual temperature from 59° to 64° F., and the average frost-free season from 220 to 270 days. Vegetation is chiefly annual grasses and chamise.

In a typical profile, the surface layer is grayish-brown clay about 23 inches thick. Underlying this is grayish-brown and pale-olive sandy clay. At a depth of about 32 inches is decomposing igneous rock.

The Bosanko soils are near the Buren, Las Posas, Cajalco, and Temescal soils.

Bosanko soils are commonly used for dryland pasture, range, and grain. Where the climate is favorable, citrus is grown.

Bosanko clay, 2 to 8 percent slopes (BfC).—This undulating to gently rolling soil occurs on uplands.

Following is a typical profile on a west-facing slope of 5 percent (500 feet north of Simpson Road and 250 feet east of the west side of section 26, T. 4 S., R. 5 W.):

Ap1—0 to 2 inches, grayish-brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) when moist; strong, medium, subangular blocky structure; extremely hard, extremely firm, very sticky and very plastic; abundant very fine roots; many, very fine, tubular pores; medium acid (pH 6.0); clear, smooth boundary. Horizon is 2 to 9 inches thick.

Ap2—2 to 9 inches, grayish-brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) when moist; strong, medium, subangular blocky structure; extremely hard, extremely firm, very sticky and very plastic; plentiful very fine roots; common, very fine, tubular pores; neutral (pH 6.8); clear, irregular boundary. Horizon is 4 to 12 inches thick.

A11—9 to 17 inches, grayish-brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) when moist; strong, medium, subangular blocky structure; extremely hard, extremely firm, very sticky and very plastic; few very fine roots; few, very fine, tubular pores; few slickensides; neutral (pH 7.0); gradual, wavy boundary. Horizon is 4 to 10 inches thick.

A12—17 to 23 inches, grayish-brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) when moist; strong, coarse, subangular blocky structure; extremely hard, extremely firm, very sticky and very plastic; few very fine roots; few, very fine, tubular pores; few slickensides; neutral (pH 7.0); gradual, wavy boundary. Horizon is 4 to 11 inches thick.

AC—23 to 27 inches, grayish-brown (10YR 5/2) sandy clay, dark grayish brown (10YR 4/2) when moist; massive, very hard, very firm, very sticky and plastic; few very fine roots; few, very fine, tubular pores; prominent slickensides; mildly alkaline (pH 7.8); slightly effervescent; gradual, wavy boundary. Horizon is 4 to 11 inches thick.,

C1—27 to 32 inches, pale-olive (5Y 6/3) sandy clay, light olive brown (2.5Y 5/4) when moist; massive; very hard, very firm, sticky and plastic; few slickensides; mildly alkaline (pH 7.8); strongly effervescent; gradual, wavy boundary. Horizon is 5 to 10 inches thick.

C2—32 to 36 inches, weathered acid igneous rock; massive; neutral (pH 7.2).

The A horizon is medium acid to neutral. Depth to weathered acid igneous rock commonly ranges from 23 to 36 inches.

Included with this soil in mapping are small areas of Cajalco fine sandy loam, Buren loam, Auld clay, and Porterville clay. Also included are small areas of gravelly or stony Bosanko clay and areas that are only 10 to 20 inches deep to the weathered igneous rock.

This soil has moderately slow permeability. The available water holding capacity is 4.0 to 5.0 inches. Runoff is medium, and the hazard of erosion is moderate. The root zone is 23 to 36 inches deep. Natural fertility is moderate.

This soil is used for dryland pasture, range, and grain and for irrigated citrus. (Capability unit IIIe-5 (19) irrigated; Clayey range site)

Bosanko clay, 8 to 15 percent slopes (BfD).—Included with this soil in mapping are small areas of gravelly or stony Bosanko clay. Also included in mapping are a few small areas of Bosanko clay that are 10 to 20 inches deep to weathered rock. Some small areas that are slightly effervescent in the surface layer are also included.

This soil is used for dryland pasture, range, and grain and for irrigated citrus. (Capability unit IIIe-5 (19) irrigated; Clayey range site)

Buchenau Series

The Buchenau series consists of moderately well drained soils on alluvial fans. Slopes range from 0 to 8 percent. These soils developed in mixed alluvium and are underlain by a platy, calcareous hardpan. Elevations range from 700 to 1,500 feet. The average annual rainfall ranges from 10 to 14 inches, the average annual temperature from 62° to 64° F., and the average frost-free season from 220 to 260 days. Vegetation is chiefly annual grasses, saltgrass, and forbs.

In a typical profile, the surface layer is brown loam about 10 inches thick. The subsoil is yellowish-brown, brown, and pale-brown clay loam and loam about 29 inches thick. The substratum is light brownish-gray loam, which overlies a cemented, platy hardpan at a depth of about 52 inches.

The Buchenau soils are near the Arlington, Buren, Greenfield, and Porterville soils.

The Buchenau soils are used for irrigated truck crops, alfalfa, permanent pasture, and grain. They are also used for dryland pasture and range and for nonfarm purposes.

Buchenau loam, slightly saline-alkali, 0 to 2 percent slopes (BhA).—This nearly level soil occurs in basins.

Following is a typical profile on a south-facing slope of 1 percent (900 feet south and 400 feet east of the north quarter corner of section 32, T. 2 S., R. 5 W.):

Ap—0 to 7 inches, brown (10YR 5/3) loam, dark brown (10YR 3/3) when moist; moderate, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; abundant very fine and few fine roots; common, very fine and few, fine, irregular and tubular pores; moderately alkaline (pH 8.0); very slightly effervescent; gradual, smooth boundary. Horizon is 7 to 15 inches thick.

A1—7 to 10 inches, brown (10YR 5/3) loam, brown to dark brown (10YR 4/3) when moist; moderate, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; abundant very fine and few fine roots; common, very fine and few, fine, irregular and tubular pores; moderately alkaline (pH 8.0); very slightly effervescent; clear, wavy boundary. Horizon is 3 to 8 inches thick.

B21t—10 to 16 inches, yellowish-brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) when moist; strong, medium, subangular blocky structure; hard, firm, sticky and slightly plastic; abundant very fine roots; common, very fine, tubular pores; few thin clay films in bridges and pores; moderately alkaline (pH 8.0); slightly effervescent; gradual, wavy boundary. Horizon is 5 to 9 inches thick.

B22t—16 to 24 inches, brown (10YR 5/3) loam, brown to dark brown (10YR 4/3) when moist; strong, coarse, subangular blocky structure; hard, firm, sticky and plastic; abundant very fine and few fine roots; common, very fine, tubular pores; few thin clay films as bridges and in pores; moderately alkaline (pH 8.0); slightly effervescent; clear, wavy boundary. Horizon is 5 to 8 inches thick.

B3t—24 to 39 inches, pale-brown (10YR 6/3) loam, brown to dark brown (10YR 4/3) when moist; massive; slightly hard, friable, slightly sticky and nonplastic; abundant very fine roots; common, very fine and few, fine, tubular pores; few thin clay films as bridges and in pores; few, fine, distinct mottles of yellowish brown; moderately alkaline (pH 8.0); slightly effervescent; clear, wavy boundary. Horizon is 4 to 15 inches thick.

C1—39 to 52 inches, light brownish-gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) when moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; common, very fine and few, fine, tubular pores; few, fine, distinct mottles of yellowish brown; moderately alkaline (pH 8.0); strongly effervescent; clear, smooth boundary. Horizon is 11 to 24 inches thick.

C2cam—52 to 61 inches. white (10YR 8/2) strongly lime-cemented hardpan, light brownish gray (2.5Y 6/2) when moist; massive, breaking to medium, platy structure; few very fine roots; common, fine and few, medium, tubular pores; strongly alkaline (pH 8.6); violently effervescent; fine and medium, generally rounded, soft masses of lime.

The A horizon is slightly to very slightly effervescent, pale-brown to dark-brown very fine sandy loam to loam. The Bt horizon is grayish-brown to yellowish-brown loam to heavy clay loam. The C horizon is light brownish-gray to white, strongly to violently effervescent loam to clay loam. Depth to the platy, calcareous pan ranges from 35 to 54 inches.

Included with this soil in mapping are small areas of Arlington fine sandy loam, Buren loam, Greenfield sandy loam, and Porterville clay. Also included are some areas that have a fine sandy loam, silt loam, or light clay loam surface layer.

Permeability of this soil is moderately slow, and the available water holding capacity is 5.0 to 8.0 inches. Runoff is very slow, and the hazard of erosion is slight. The root zone is 35 to 54 inches deep, and natural fertility is moderately high.

This Buchenau soil is used for irrigated truck crops, alfalfa, grain, and permanent pasture. It is also used for dryland pasture and range and for homesites. (Capability unit IIs-8 (19) irrigated; Loamy range site)

Buchenau loam, slightly saline-alkali, 2 to 8 percent slopes (BhC).—The profile of this soil is similar to that described for the Buchenau series, but the depth to the platy pan is 24 to 36 inches. Included with this soil in mapping are small areas having slopes of 8 to 25 percent. Also included are areas that are 36 to 54 inches deep to the pan.

Runoff on this soil is medium, and the hazard of erosion is moderate. The available water holding capacity is 3.75 to 5.0 inches.

This soil is used for dryland grain and pasture, for irrigated pasture and alfalfa, and for nonfarm purposes.

(Capability unit IIIe-6 (19) irrigated; Loamy range site)

Buchenau silt loam, 2 to 8 percent slopes, eroded (BkC2).—The profile of this soil is similar to that described for the Buchenau series, but it has a silt loam surface layer and is not saline-alkali. Small flat gullies occur.

Included with this soil in mapping are a few small areas having a fine sandy loam surface layer and a small area of Buchenau soil with a gravelly loam surface layer. Some severely eroded areas are included that are only 14 to 24 inches deep over a weakly cemented pan. Also included is a small area having slopes of 8 to 25 percent.

Runoff is medium on this soil, and the hazard of erosion is moderate. The available water holding capacity is 4.0 to 8.0 inches. The root zone is 24 to 54 inches deep. Natural fertility is moderately high.

This soil is used for dryland pasture, range, and grain and for nonfarm purposes. (Capability unit IIIe-1 (19) irrigated; Loamy range site)

Bull Trail Series

Soils of the Bull Trail series are on dissected, old alluvial fans and terraces. Slopes are 5 to 25 percent. These well-drained soils developed in alluvium derived from granitic and metamorphic rocks. Elevations range from 3,500 to 5,600 feet. The average annual rainfall ranges from 13 to 25 inches, the average annual temperature from 52° to 57° F., and the average frost-free season from 150 to 225 days. Vegetation is chiefly annual grasses, forbs, chamise, and scrub oaks.

In a typical profile, the surface is grayish-brown sandy loam about 8 inches thick. The subsoil is brown and yellowish-brown coarse sandy clay loam about 22 inches thick. The substratum is yellowish-brown loam and coarse sandy loam. A weakly cemented pan is at a depth of 55 inches.

The Bull Trail soils are near the Mottsville, Oak Glen, and Calpine.

Bull Trail soils are used for dryland pasture, range, and grain.

Bull Trail sandy loam, 8 to 15 percent slopes, eroded (BsD2).—This strongly sloping soil occurs on terraces.

Following is a typical profile on a west-facing slope of 12 percent (1,280 feet west and 1,000 feet south of the east quarter corner of section 5, T. 8 S., R. 2 E.):

Ap—0 to 8 inches, grayish-brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, medium, granular structure; soft, very friable, nonsticky and nonplastic; abundant fine roots; medium acid (pH 6.0); clear, smooth boundary. Horizon is 2 to 8 inches thick.

B21t—8 to 11 inches, brown (10YR 5/3) coarse sandy clay loam, dark grayish brown (10YR 4/2) when moist; moderate, medium, subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; plentiful fine and medium roots; many, fine and few, medium, tubular pores; common moderately thick clay films on ped faces; medium acid (pH 6.0); clear, smooth boundary. Horizon is 2 to 8 inches thick.

B22t—11 to 16 inches, brown (10YR 5/3) coarse sandy clay loam, dark grayish brown (10YR 4/2) when moist; moderate, medium, subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; plentiful fine roots; common, fine, tubular pores; common moderately thick clay films on ped faces; medium acid (pH 6.0); gradual, smooth boundary. Horizon is 4 to 9 inches thick.

B23t—16 to 22 inches, brown (10YR 5/3) coarse sandy clay loam, dark grayish brown (10YR 4/2) when moist; massive; moderate, medium, angular blocky structure; very hard, firm, sticky and slightly plastic; plentiful fine roots; common, fine, tubular pores; few moderately thick clay films in pores; medium acid (pH 6.0); gradual, smooth boundary. Horizon is 6 to 17 inches thick.

B3t—22 to 30 inches, yellowish-brown (10YR 5/4) coarse sandy loam, dark yellowish brown (10YR 4/4) when moist; massive; hard, firm, slightly sticky and slightly plastic; plentiful fine roots; common, fine, tubular pores; common thin clay films in pores; slightly acid (pH 6.5); gradual, smooth boundary. Horizon is 3 to 8 inches thick.

C1—30 to 45 inches, yellowish-brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) when moist; massive; hard, friable, slightly sticky and slightly plastic; few fine roots; many, fine, irregular pores; neutral (pH 6.7); gradual, smooth boundary. Horizon is 9 to 15 inches thick.

C2—45 to 55 inches, yellowish-brown (10YR 5/4) coarse sandy loam, dark yellowish brown (10YR 4/4) when moist; massive; slightly hard, friable, nonsticky and nonplastic; many, fine, irregular pores; neutral (pH 7.0); abrupt, smooth boundary. Horizon is 5 to 10 inches thick.

C3—55 to 60 inches, pale-brown (10YR 6/3), weakly cemented fine sandy loam, brown to dark brown (10YR 4/3) when moist; massive; very hard, firm, slightly sticky and slightly plastic; very few, very fine, tubular pores; neutral (pH 7.0).

The A horizon is grayish brown to brown in color and coarse sandy loam to fine sandy loam in texture. The Bt horizon is brown to yellowish brown or reddish brown in color and loam to coarse sandy clay loam in texture. The C horizon is slightly acid to neutral, pale brown to brown or yellowish brown, and coarse sandy loam to loam. Depth to the pan commonly ranges from 20 to more than 60 inches.

Included with this soil in mapping are small areas of Mottsville loamy sand, Oak Glen fine sandy loam, Calpine sandy loam, Tollhouse sandy loam, and Crouch sandy loam. Some severely eroded areas and some Bull Trail soils having slopes of 15 to 25 percent are also included.

Permeability of this soil is moderately slow. The available water holding capacity is 4.0 to 8.0 inches. Runoff is medium, and the hazard of erosion is moderate. The root zone is 20 to more than 60 inches deep. Natural fertility is moderately low.

This Bull Trail soil is used mainly for dryland pasture and range. Some small areas are in grain. (Capability unit IVec-1 (20) dryland; Loamy Uplands range site)

Bull Trail sandy loam, 5 to 8 percent slopes, eroded (BsC2).—Included with this soil in mapping are a few small areas that have slopes of 2 to 5 percent. Also included are some severely eroded areas.

Runoff on this soil is slow to medium, and the hazard of erosion is slight to moderate.

This soil is used for dryland pasture, range, and grain. (Capability unit IVec-1 (20) dryland; Loamy Uplands range site)

Bull Trail sandy loam, 8 to 25 percent slopes, severely eroded (BsE3).—The profile of this soil is similar to that described for the Bull Trail series, but its surface layer is less than 4 inches thick. Included with this soil in mapping are a few small areas that have slopes of 25 to 50 percent.

The available water holding capacity is 3.0 to 4.0 inches. Runoff is medium to rapid, and the hazard of erosion is high. The root zone is 20 to 36 inches deep. Natural fertility is low.

This soil is used for range. (Capability unit VIIe-1 (20) dryland; Loamy Uplands range site)

Bull Trail stony sandy loam, 8 to 15 percent slopes, eroded (BtD2).—The profile of this soil is similar to that described for the Bull Trail series, but it has a stony sandy loam surface layer. Included in mapping are small areas of Bull Trail soils with a gravelly fine sandy loam surface layer.

The available water holding capacity of this soil is 2.5 to 3.5 inches. Runoff is medium, and the hazard of erosion is moderate. Natural fertility is low.

This soil is used for dryland pasture and range. (Capability unit VIe-7 (20) dryland; Loamy Uplands range site)

Bull Trail stony sandy loam, 8 to 25 percent slopes, severely eroded (BtE3).—The profile of this soil is similar to that described for the Bull Trail series, but it has a stony sandy loam surface layer that is less than 4 inches thick. Included with this soil in mapping is a small area of Bull Trail soils that have slopes of 25 to 50 percent.

The available water holding capacity of this soil is 1.5 to 3.0 inches. Runoff is rapid, and the hazard of erosion is high. The root zone is 20 to 36 inches deep. Natural fertility is low.

This soil is used for range. (Capability unit VIe-7 (20) dryland: Loamy Uplands range site)

Buren Series

In the Buren series are moderately well drained soils on terraces and alluvial fans. Slopes range from 2 to 15 percent. These soils developed in alluvium from mixed sources and are underlain by a weakly cemented pan. Elevations range from 700 to 3,000 feet. The average annual rainfall ranges from 10 to 14 inches, the average annual temperature from 61° to 65° F., and the average frost-free season from 230 to 300 days. Vegetation is chiefly annual grasses, forbs, and chamise.

In a typical profile, the surface layer is yellowish-brown and brown fine sandy loam about 12 inches thick. The subsoil is brown and pale-brown clay loam in the upper part. It becomes light olive-brown loam at a depth of 28 inches. The substratum is yellowish-brown, weakly cemented loam at a depth of about 37 inches.

The Buren soils are near the Hanford, Arlington, Wyman, and Cajalco soils.

The Buren soils are used for irrigated citrus, truck crops, and alfalfa, for dryland grain, pasture, and range, and for nonfarm purposes.

Buren fine sandy loam, 2 to 8 percent slopes, eroded (BuC2).—This gently to moderately sloping soil occurs on alluvial fans and terraces.

Following is a typical profile on a north-facing slope of 2 percent (1,400 feet south and 200 feet west of the northeast corner of section 17, T. 3 S., R. 5 W.):

Ap1—0 to 7 inches, yellowish-brown (10YR 5/4) fine sandy loam, dark brown (10YR 3/3) when moist; weak, coarse, granular structure; slightly hard, very friable, slightly sticky and plastic; plentiful fine and medium roots; common, fine, tubular pores; moderately alkaline (pH 8.0); abrupt, smooth boundary. Horizon is 5 to 10 inches thick.

Ap2—7 to 12 inches, brown (10YR 5/3) fine sandy loam, dark yellowish brown (10YR 4/4) when moist; massive; hard, friable, slightly sticky and plastic; few, fine, random roots; common, fine, tubular pores; moderately alkaline (pH 8.0); clear, smooth boundary. Horizon is 4 to 7 inches thick.

B21t—12 to 19 inches, brown or dark-brown (7.5YR 4/4) clay loam, dark brown (7.5YR 4/4) when moist; strong, coarse, angular blocky structure; very hard, very firm, very sticky and very plastic; plentiful, fine, random roots; common, fine, tubular pores; many moderately thick clay films on ped faces; moderately alkaline (pH 8.0); gradual, smooth boundary. Horizon is 5 to 10 inches thick.

B22tca—19 to 28 inches, pale-brown (10YR 6/3) clay loam, brown or dark brown (10YR 4/3) when moist; moderate, fine, angular blocky structure; very hard, very firm, sticky and plastic; few, fine, random roots; common, fine, tubular pores; common moderately thick clay films on ped faces; moderately alkaline (pH 8.4); strongly effervescent; medium filaments and threads and medium, rounded, soft masses of calcium carbonate (light gray, 10YR 7/2 dry); clear, smooth boundary. Horizon is 7 to 12 inches thick.

B3ca—28 to 37 inches, light olive-brown (2.5Y 5/4) loam, olive brown (2.5Y 4/4) when moist; massive; very hard, firm, slightly sticky and plastic; very few, fine, random roots; many, fine, tubular pores; a few thin clay films line tubular pores; moderately alkaline (pH 8.4); slightly effervescent; fine filaments and threads of lime; clear, smooth boundary. Horizon is 6 to 10 inches thick.

C1si—37 to 47 inches, yellowish-brown (10YR 5/4), weakly cemented loam, dark yellowish brown (10YR 4/4) when moist; very coarse polygons, sides of which are faced with thin lime and silica coatings, light yellowish brown (10YR 6/4) when dry; very hard, firm, slightly sticky and plastic; many, fine, tubular pores; moderately alkaline (pH 8.4); slightly effervescent; fine threads and filaments of calcium carbonate; gradual, smooth boundary. Horizon is 8 to 14 inches thick.

C2si—47 to 52 inches, light yellowish-brown (10YR 6/4) loam, brown or dark brown (10YR 4/3) when moist; massive, about 30 percent of mass appears to be durinodes; very hard, firm, slightly sticky and plastic; common, fine, tubular pores; moderately alkaline (pH 8.4); slightly effervescent; fine threads and filaments of calcium carbonate.

The A horizon is slightly acid to moderately alkaline fine sandy loam to sandy loam. The Bt horizon is generally neutral to moderately alkaline, noneffervescent to strongly effervescent loam to silty clay loam. The color of the Bt horizon ranges from yellowish brown to dark brown and light olive brown to pale brown. The Csi horizon is light brownish gray to pale brown or light yellowish brown in color. It is a weakly cemented sandy loam or loam that occurs at a depth commonly ranging from 27 to 40 inches.

Included with this soil in mapping are small areas of Arlington fine sandy loam, Cajalco fine sandy loam, Wyman fine sandy loam, and Hanford coarse sandy loam. Some small areas are also included that have a sandy loam or gravelly fine sandy loam surface layer. Some inclusions are eroded Buren soils.

Permeability of this soil is moderately slow, and the available water holding capacity is 5.0 to 7.0 inches. Runoff is medium, and the hazard of erosion is moderate. The root zone is 27 to 40 inches deep. Natural fertility is moderately high.

This soil is used for dryland pasture, grain, and range, for irrigated citrus, truck crops, and alfalfa, and for nonfarm purposes. (Capability unit IIIe-8 (19) irrigated; Loamy range site)

Buren fine sandy loam, 8 to 15 percent slopes, eroded (BuD2).—Included with this soil in mapping are a few small areas having a very fine sandy loam surface layer. Also included are some Buren soils that have slopes of 15 to 25 percent.

Runoff is medium on this soil, and the hazard of erosion is high. Natural fertility is moderately high.

This soil is used for dryland grain, pasture, and range, for irrigated citrus and alfalfa, and for nonfarm purposes. (Capability unit IVe-8 (19) irrigated; Loamy range site)

Buren loam, 5 to 15 percent slopes, severely eroded (BvD3).—The profile of this soil is similar to that described for the Buren series, but it has a loam surface layer and is severely eroded. Included in mapping are some small areas of gently sloping Buren soils.

The available water holding capacity of this soil is 3.0 to 5.0 inches. Runoff is rapid, and the hazard of erosion is high. The root zone is 20 to 27 inches deep. Natural fertility is low.

This soil is used for dryland grain, pasture, and range, for irrigated citrus and alfalfa, and for nonfarm purposes. (Capability unit IVe-8 (19) irrigated; Loamy range site)

Buren loam, deep, 2 to 8 percent slopes, eroded (BxC2). —The profile of this soil is similar to that described for the Buren series, but it has a loam surface layer and is 40 to 50 inches deep to the pan.

Included with this soil in mapping are some small areas of Buren soils that are 24 to 40 inches deep to the pan. Also included are some areas of Buren soils with a sandy loam surface layer.

Runoff is slow to medium on this soil, and the hazard of erosion is slight to moderate. The available water holding capacity is 6.0 to 8.0 inches. Natural fertility is high.

This soil is used for dryland grain, pasture, and range, for irrigated citrus, alfalfa, and truck crops, and for nonfarm purposes. (Capability unit IIe-1 (19) irrigated; Loamy range site)

Cajalco Series

The Cajalco series consists of well-drained soils developed in decomposing gabbro and other basic igneous rocks. Rock outcrops occur in some areas. These soils are on uplands and have slopes of 2 to 50 percent. Elevations range from 900 to 2,700 feet. The average annual rainfall ranges from 10 to 16 inches, the average annual temperature from 61° to 65° F., and the average frost-free season from 230 to 300 days. Vegetation is chiefly annual grasses, forbs, and chamise.

In a typical profile, the surface layer is yellowish-brown fine sandy loam about 10 inches thick. The subsoil is brown fine sandy loam and loam. It grades to light yellowish-brown loam at a depth of about 18 inches. At a depth of about 22 inches is weathered gabbro.

The Cajalco soils are near the Temescal, Las Posas, Honcut, and Wyman soils.

Cajalco soils are used for dryland pasture, grain, and range, for irrigated citrus, and for nonfarm purposes.

Cajalco fine sandy loam, 8 to 15 percent slopes, eroded (CaD2).—This rolling soil occurs on uplands.

Following is a typical profile on a west-facing slope of 8 percent (1,350 feet north and 800 feet west of the southeast corner of section 22, T. 4 S., R. 5 W.):

Ap1—0 to 3 inches, yellowish-brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 3/4) when moist; weak, coarse, granular structure; soft, very friable, nonsticky and nonplastic; abundant very fine roots; many, very fine, irregular pores; slightly acid (pH 6.5); clear, smooth boundary. Horizon is 2 to 5 inches thick.

Ap2—3 to 10 inches, yellowish-brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 3/4) when moist; weak, coarse, granular structure; slightly hard, very friable, slightly sticky and nonplastic; abundant very fine and few medium roots; many, very fine, irregular and tubular pores; slightly acid (pH 6.5); gradual, wavy boundary. Horizon is 4 to 8 inches thick.

B1—10 to 13 inches, brown (7.5YR 5/4) fine sandy loam, dark reddish brown (5YR 3/4) when moist; weak, coarse, subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; abundant very fine roots; many, very fine, tubular pores; few thin clay films line tubular pores; neutral (pH 7.0); gradual, wavy boundary. Horizon is 3 to 7 inches thick.

B2—13 to 18 inches, brown (7.5YR 5/4) loam, dark reddish brown (5YR 3/4) when moist; moderate, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; plentiful very fine roots; many, very fine, tubular pores; few thin clay films line tubular pores; neutral (pH 7.0); clear, wavy boundary. Horizon is 4 to 15 inches thick.

B3—18 to 22 inches, light yellowish-brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) when moist; massive; hard, friable, slightly sticky and nonplastic; plentiful very fine roots; many, very fine, tubular pores; neutral (pH 7.0); gradual, wavy boundary. Horizon is 3 to 11 inches thick.

C1—22 to 30 inches, light yellowish-brown (10YR 6/4), well-weathered gabbro, yellowish brown (10YR 5/4) when moist; massive; hard, friable, nonsticky and nonplastic; mildly alkaline (pH 7.5); gradual, wavy boundary. Horizon is 4 to 22 inches thick.

C2—30 to 62 inches, light-gray (10YR 6/1) decomposing gabbro, gray (10YR 5/1) when moist; massive; very hard, very friable, nonsticky and nonplastic; slightly acid (pH 6.5).

The A horizon is yellowish-brown to dark-brown fine sandy loam to loam. The B horizon is brown to reddish-brown or yellowish-brown fine sandy loam or loam to clay loam. The C horizon is mildly alkaline to slightly acid, light-gray to dark-brown, weathered gabbro. Seams and pockets of calcium carbonate are present. The depth to the weathered gabbro ranges from 18 to 46 inches.

Included with this soil in mapping are small areas of Honcut sandy loam, Wyman fine sandy loam, Las Posas loam, and Temescal rocky loam. Some Cajalco soils having slopes of 2 to 5 percent and a very fine sandy loam or gravelly very fine sandy loam surface layer are also included.

Permeability of this soil is moderate. The available water holding capacity is 2.0 to 6.0 inches. Runoff is medium, and the hazard of erosion is moderate. The root zone is 20 to 46 inches deep. Natural fertility is moderate.

This Cajalco soil is used for dryland pasture, grain, and range, for irrigated citrus, and for nonfarm purposes. (Capability unit IVe-1 (19) irrigated; Loamy range site)

Cajalco fine sandy loam, 2 to 8 percent slopes, eroded (CaC2).—Depth of this soil to partly weathered rock is 30 to 36 inches. Included in mapping are some small areas that are 36 to 46 inches deep to weathered rock.

The available water holding capacity of this soil is 4.0 to 5.0 inches. Runoff is slow to medium, and the hazard of erosion is slight to moderate.

This soil is used for dryland grain, pasture, and range, for irrigated citrus, and for nonfarm purposes. (Capability unit IIIe-1(19) irrigated; Loamy range site)

Cajalco fine sandy loam, 15 to 35 percent slopes, eroded (CaF2).—Depth of this soil to partly weathered rock is 20 to 34 inches. Cajalco soils that have a very fine

sandy loam surface layer are included with this soil in mapping.

Runoff is rapid on this soil, and the hazard of erosion is high. The available water holding capacity is 3.0 to 5.0 inches.

This soil is used for dryland pasture, range, and grain, for irrigated citrus, and for nonfarm purposes. (Capability unit VIe-1 (19) dryland; Shallow Loamy range site)

Cajalco rocky fine sandy loam, 5 to 15 percent slopes, eroded (CbD2).—The profile of this soil is similar to that described for the Cajalco series, but it is 18 to 24 inches deep to weathered rock. Rock outcrops cover 2 to 10 percent of the surface. A few small areas that have a stony very fine sandy loam surface layer are included.

Runoff is slow to medium on this soil, and the hazard of erosion is slight to moderate. The available water holding capacity is 2.0 to 3.0 inches. The root zone is 18 to 24 inches deep. Natural fertility is low.

This soil is used mainly for dryland pasture and range. In some places it is used for irrigated citrus and for homesites. (Capability unit VIe-7 (19) dryland; Shallow Loamy range site)

Cajalco rocky fine sandy loam, 15 to 50 percent slopes, eroded (CbF2).—The profile of this soil is similar to that described for the Cajalco series, but it is 18 to 24 inches deep to weathered rock. Rock outcrops cover 2 to 10 percent of the surface.

Included in mapping are some areas having a very fine sandy loam or stony very fine sandy loam surface layer. In addition, some included areas are severely eroded.

Runoff is rapid on this soil, and the hazard of erosion is high. The available water holding capacity is 2.0 to 3.0 inches. The root zone is 18 to 24 inches deep. Natural fertility is low.

This soil is used for dryland pasture and range. (Capability unit VIe-7 (19) dryland; Shallow Loamy range site)

Calpine Series

The Calpine series is made up of well-drained soils on alluvial fans and in valley fills. Slopes are 2 to 15 percent. These soils developed in alluvium consisting predominantly of granitic materials. Elevations range from 3,500 tc 6,000 feet. The average annual rainfall ranges from 11 to 25 inches, the average annual temperature from 52° to 57° F., and the average frost-free season from 150 to 180 days. The vegetation is chiefly annual grasses, pine bluegrass, ceanothus, big sagebrush, and manzanita. A few areas have scrub oaks and redshank.

In a typical profile, the surface layer is brown to dark-brown sandy loam about 7 inches thick. The subsoil is dark yellowish-brown sandy loam about 26 inches thick. The substratum is yellowish-brown loamy coarse sand.

The Calpine soils are near the Oak Glen, Mottsville, and Bull Trail soils.

The Calpine soils are used for dryland pasture and range and for irrigated apples, pears, peaches, alfalfa, and potatoes.

Calpine sandy loam, 2 to 8 percent slopes, eroded (CcC2).—This gently sloping to moderately sloping soil occurs on alluvial fans.

Following is a typical profile on a northeast-facing slope of 5 percent (120 feet south and 50 feet east of the northwest corner of section 14, T. 8 S., R. 3 E.):

A1—0 to 7 inches, brown to dark-brown (10YR 4/3) sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, fine, crumb structure; soft, very friable, nonsticky and nonplastic; abundant fine and very fine roots; medium acid (pH 6.0); clear, smooth boundary. Horizon is 6 to 16 inches thick.

B1—7 to 12 inches, dark yellowish-brown (10YR 4/4) sandy loam, dark brown (10YR 3/3) when moist; weak, coarse, subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; few fine and medium roots; common, medium, tubular pores; few thin clay films in pores; medium acid (pH 5.7); clear, smooth boundary. Horizon is 4 to 8 inches thick.

B21—12 to 19 inches, dark yellowish-brown (10YR 4/4) sandy loam, dark brown (10YR 3/3) when moist; medium, coarse, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few medium roots; common, medium, tubular pores; common thin clay films in pores; medium acid (pH 5.7); gradual, smooth boundary. Horizon is 6 to 10 inches thick.

B22—19 to 25 inches, dark yellowish-brown (10YR 4/4) sandy loam, dark yellowish brown (10YR 3/4) when moist; medium, coarse, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few medium roots; common, medium, tubular pores; common thin clay films in pores; medium acid (pH 5.6); gradual, smooth boundary. Horizon is 6 to 15 inches thick.

B3—25 to 33 inches, dark yellowish-brown (10YR 4/4) sandy loam, dark yellowish brown (10YR 3/4) when moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common, medium, tubular pores; few thin clay films in pores; medium acid (pH 5.9); clear, smooth boundary. Horizon is 8 to 14 inches thick.

C—33 to 60 inches, yellowish-brown (10YR 5/4) loamy coarse sand, dark yellowish brown (10YR 4/4) when moist; massive; slightly hard, friable, nonsticky and nonplastic; medium acid (pH 6.0).

The A horizon ranges from medium acid to slightly acid in reaction, from dark grayish brown to dark yellowish brown in color, and from loamy fine sand to very fine sandy loam in texture. The B horizon is generally slightly acid to medium acid, dark yellowish-brown to grayish-brown sandy loam to loam. The C horizon is slighly acid to medium acid, brown to yellowish-brown loamy coarse sand to fine sandy loam.

Included with this soil in mapping are small areas of Mottsville loamy sand, Oak Glen fine sandy loam, and Bull Trail sandy loam. Some small areas with a gravelly sandy loam or very fine sandy loam surface layer and a coarse sandy substratum are also included.

Permeability of this soil is moderately rapid. The available water holding capacity is 5.0 to 7.5 inches. Runoff is slow to medium, and the hazard of erosion is slight to moderate. The root zone is more than 60 inches deep, and natural fertility is high.

This soil is used for dryland pasture (domestic rye) and range. It also is used for irrigated alfalfa, peaches, pears, apples, and potatoes. (Capability unit IIe-1 (20) irrigated, IVec-1 (20) dryland; Loamy Uplands range site)

Calpine sandy loam, 8 to 15 percent slopes, eroded (CcD2).—Included with this soil in mapping are some small areas that have a gravelly fine sandy loam or gravelly sandy loam surface layer. Also included are some areas with a sandy loam substratum. Slopes of some inclusions are as much as 25 to 35 percent.

Runoff is medium on this soil, and the hazard of erosion is moderate. Natural fertility is moderate.

This soil is used for irrigated peaches and for dryland

pasture and grain. (Capability unit IIIe-1 (20) irrigated, IVec-1 (20) dryland; Loamy Uplands range site)

Calpine loam, 2 to 8 percent slopes, eroded (CdC2).—The profile of this soil differs from that described for the Calpine series because it has a loam surface layer about 8 to 18 inches thick. Included in mapping are a few small areas having slopes of 0 to 2 percent. Also included are small areas that have a sandy loam substratum.

Runoff is slow to medium on this soil, and the hazard of erosion is slight to moderate. The available water holding capacity is 6.0 to 8.0 inches.

This soil is used for dryland pasture and for irrigated alfalfa, potatoes, and apples. (Capability unit IIe-1 (20) irrigated, IVec-1 (20) dryland; Loamy Uplands range site)

Chino Series

In the Chino series are somewhat poorly drained to poorly drained soils that developed in granitic alluvium. These soils are on slopes of 0 to 2 percent in basins and on flood plains. Elevations range from 500 to 1,600 feet. The average annual rainfall ranges from 10 to 13 inches, the average annual temperature from 62° to 65° F., and the average frost-free season from 210 to 250 days. The vegetation is chiefly annual grasses, weeds, and sedges.

In a typical profile, the surface layer is gray silt loam about 14 inches thick. The underlying material is gray to light-gray silty clay loam that extends to depths greater than 60 inches. In some places, these soils are affected by salts and alkali. The Chino soils are near the Grangeville, Domino, and Willows soils.

Chino soils are used for dryland grain, pasture, and range and for irrigated truck crops, alfalfa, and permanent pasture. Some areas are used for homesites.

Chino silt loam, drained (0 to 2 percent slopes) (Ce).—This nearly level soil occurs in basins and on flood plains.

Following is a typical profile on a southwest-facing slope of 1 percent (600 feet south and 800 feet west of the center of section 34, T. 2 S., R. 7 W.):

A11—0 to 7 inches, gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) when moist; strong, fine, granular structure; soft, friable, slightly sticky and plastic; abundant very fine to medium roots; few, fine, tubular pores; moderately alkaline (pH 8.2); strongly effervescent; gradual, smooth boundary. Horizon is 5 to 10 inches thick.

A12—7 to 14 inches, gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) when moist; weak, medium, subangular blocky structure; slightly hard, firm, slightly sticky and plastic; abundant very fine to medium roots; few, fine, tubular pores; moderately alkaline (pH 8.2); strongly effervescent; clear, wavy boundary. Horizon is 4 to 8 inches thick.

C1—14 to 27 inches, gray (10YR 5/1) silty clay loam, very dark gray (10YR 3/1) when moist; weak, coarse, angular blocky structure; hard, firm, sticky and plastic; plentiful very fine to medium roots; common, fine to coarse, tubular pores; moderately alkaline (pH 8.2); strongly effervescent; gradual, smooth boundary. Horizon is 8 to 15 inches thick.

C2—27 to 46 inches, gray to light-gray (10YR 6/1) silty clay loam, dark gray (10YR 4/1) when moist; weak, medium, angular blocky structure; hard, firm, sticky and plastic; plentiful very fine to medium roots; common, fine, tubular pores; moderately alkaline (pH 8.2); strongly effervescent; gradual, smooth boundary. Horizon is 12 to 22 inches thick.

C3—46 to 60 inches, gray to light-gray (10YR 6/1) silty clay loam, dark gray (10YR 4/1) when moist; weak, coarse, angular blocky structure; hard, firm, sticky and plastic; few very fine to fine roots; many, fine to coarse, tubular pores; a few slickensides; moderately alkaline (pH 8.2); strongly effervescent.

The A horizon is gray to dark gray in color.

Included with this soil in mapping are small areas of Grangeville sandy loam, Domino silt loam, and Willows silty clay. Some small areas that have a water table at a depth of 36 to 48 inches during part of the year are included. About a fourth of the acreage mapped as this soil is included small areas having slopes of 2 to 5 percent.

This was a somewhat poorly drained soil that is now drained. It is slightly saline-alkali. Its permeability is moderately slow, and the available water holding capacity is 9.0 to 11.0 inches. Runoff is slow, and the hazard of erosion is slight. The root zone is more than 60 inches deep. Natural fertility is moderately high.

This soil is used for irrigated truck crops, alfalfa, and permanent pasture, for dryland grain, and for homesites. (Capability unit I-1 (19) irrigated; Silty Basin range site)

Chino silt loam, drained, saline-alkali (0 to 2 percent slopes) (Cf).—The profile of this soil is similar to that described for the Chino series, but it is moderately to strongly saline-alkali and has a loam or silt loam substratum.

Included with this soil in mapping are small areas of Chino soils that have a sandy loam or very fine sandy loam substratum, and a few small areas of deposition and erosion. Also included are areas having slopes of 2 to 5 percent and small areas with a water table at a depth of 36 to 48 inches during part of the year.

The natural fertility of this soil is moderately low.

This soil is used for dryland grain, pasture, and range. It also is used for irrigated truck crops, alfalfa, and pasture and for homesites. (Capability unit IVs-6 (19) irrigated; Silty Basin range site)

Chino silt loam, strongly saline-alkali (0 to 2 percent slopes) (Cg).—The profile of this soil is similar to that described as typical for the Chino series, but it is strongly saline-alkali and has a water table at a depth of 18 to 36 inches. Drainage is poor, and natural fertility is moderately low.

This soil is used for dryland pasture and range. (Capability unit IVw-6 (19) irrigated; Silty Basin range site)

Cieneba Series

The Cieneba series consists of somewhat excessively drained soils on uplands. Slopes range from 5 to 50 percent. These soils formed in coarse-grained igneous rock. Elevations range from 900 to 3,500 feet. The average annual rainfall ranges from 9 to 16 inches, the average annual temperature from 59° to 65° F., and the average frost-free season from 220 to 300 days. The vegetation is chiefly annual grasses, chamise, and flat-top buckwheat.

In a typical profile, the surface layer is brown sandy loam about 14 inches thick. Underlying this is light yellowish-brown gravelly coarse sand. At a depth of about 22 inches is slightly acid, weathered granodiorite.

The Cieneba soils are near the Vista, Fallbrook, Friant, and Escondido soils.

The Cieneba soils are used for dryland grain, pasture, and range, for irrigated citrus, and for homesites.

Cieneba rocky sandy loam, 15 to 50 percent slopes, eroded (CkF2).—This hilly to very steep soil occurs on

uplands. Rock outcrops occupy 2 to 10 percent of the surface.

Following is a typical profile on a north-facing slope of 35 percent (1,060 feet east and 1,060 feet south of the west quarter corner of section 27, T. 3 S., R. 6 W.):

O1—¼ inch to 0, slightly decomposed woody plant material and grass; abrupt, smooth boundary.

A11—0 to 8 inches, brown (10YR 5/3) sandy loam (10 percent fine gravel), dark brown (10YR 3/3) when moist; weak, medium and coarse, granular structure; soft, very friable, nonsticky and nonplastic; abundant very fine and few fine roots; many, very fine and fine, irregular pores and few, very fine, tubular pores; medium acid (pH 5.6); clear, wavy boundary. Horizon is 4 to 11 inches thick.

A12—8 to 14 inches, brown (10YR 5/3) sandy loam (10 percent fine gravel), dark grayish brown (10YR 4/2) when moist; weak, medium to coarse, subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; plentiful very fine and fine and few medium roots; many, fine and very fine, irregular and tubular pores; medium acid (pH 6.0); clear, irregular boundary. Horizon is 4 to 8 inches thick.

C1—14 to 22 inches, light yellowish-brown (10YR 6/4) gravelly coarse sand (approximately 40 percent quartz fragments), yellowish brown (10YR 5/4) when moist; massive; hard, friable, nonsticky and nonplastic; plentiful, very fine, random roots and few fine roots; few, very fine and fine, irregular and tubular pores; slightly acid (pH 6.5); abrupt, irregular boundary. Horizon is 2 to 14 inches thick.

C2—22 inches, weathered granodiorite, jointed and shattered, and light yellowish-brown (10YR 6/4) gravelly coarse sand, yellowish brown (10YR 5/4) when moist; abundant fine and very fine roots in the fracture planes; most surfaces of the relic rock have moderately thick clay films and thin coatings of silica material; slightly acid.

The A horizon is sandy loam to fine sandy loam. The C1 horizon is light yellowish-brown to reddish-brown loamy sand to gravelly coarse sand. The C2 horizon is weathered granodiorite that has moderately thick clay films and thin coatings of silica in fractured planes. Depth to the granodiorite commonly ranges from 10 to 22 inches. Bedrock crops out in some places.

Included with this soil in mapping are small areas of Vista coarse sandy loam, Fallbrook sandy loam, Friant fine sandy loam, and Escondido fine sandy loam. Also included are small areas having a rocky loamy sand or cobbly fine sandy loam surface layer.

Permeability of this soil is rapid, and the available water holding capacity is 1.0 to 1.5 inches. Runoff is rapid, and the hazard of erosion is high. The root zone is 10 to 22 inches deep. Natural fertility is very low.

This soil is used for range. (Capability unit VIIe-1 (19) dryland; Shallow Loamy range site)

Cieneba rocky sandy loam, 8 to 15 percent slopes, eroded (CkD2).—Rock outcrops cover 2 to 10 percent of the surface of this soil. Included in mapping are a few small areas having a cobbly sandy loam surface layer. Runoff is medium on this soil, and the hazard of erosion is moderate.

This soil is used for range. (Capability unit VIe-7 (19) dryland; Shallow Loamy range site)

Cieneba sandy loam, 5 to 8 percent slopes (ChC).—The profile of this soil is similar to that described for the Cieneba series, but it has a sandy loam surface layer. Less than 2 percent of the surface is occupied by rock outcrops.

Included with this soil in mapping are small areas having a loamy coarse sand or gravelly fine sandy loam surface layer. Also included are some areas where slopes are 2 to 5 percent.

Runoff on this soil is slow, and the hazard of erosion is slight. The root zone is 16 to 22 inches deep.

This soil is used for dryland grain, pasture, and range, for irrigated citrus, and for nonfarm purposes. (Capability unit IVe-1 (19) irrigated; Shallow Loamy range site)

Cieneba sandy loam, 8 to 15 percent slopes, eroded (ChD2).—The profile of this soil is similar to that described for the Cieneba series, but it has a sandy loam surface layer. Less than 2 percent of the surface is occupied by rock outcrops.

Included with this soil in mapping is a small area, south of Beaumont, that is underlain by weakly consolidated, coarse-grained, granitic alluvium. Also included are small areas having a gravelly sandy loam or a fine sandy loam surface layer.

The available water holding capacity of this soil is 2.0 to 3.0 inches. Runoff is medium, and the hazard of erosion is moderate. The root zone is 16 to 22 inches deep. Natural fertility is low.

This soil is used for dryland grain, pasture, and range, for irrigated citrus, and for homesites. (Capability unit VIe-1 (19) dryland; Shallow Loamy range site)

Cieneba sandy loam, 15 to 50 percent slopes, eroded (ChF2).—The profile of this soil is similar to that described for the Cieneba series, but it has a sandy loam surface layer. Less than 2 percent of the surface is occupied by rock outcrops.

Included in mapping are a few small areas having a loamy sand or fine sandy loam surface layer.

This soil is used chiefly for range. Small areas that occur in fields used for citrus are used like the surrounding soils. (Capability unit VIIe-1 (19) dryland; Shallow Loamy range site)

Cortina Series

In the Cortina series are somewhat excessively drained and excessively drained soils on alluvial fans and in valley fills. Slopes are 0 to 12 percent. These soils formed in alluvium from metasedimentary rocks. Elevations range from 600 to 2,000 feet. The average annual rainfall ranges from 10 to 15 inches, the average annual temperature from 60° to 65° F., and the average frost-free season from 240 to 300 days. The vegetation is chiefly annual grasses, flat-top buckwheat, sumac, and chamise.

In a typical profile, the surface layer is grayish-brown gravelly coarse sandy loam about 10 inches thick. Below this is grayish-brown gravelly sandy loam and very gravelly coarse sandy loam. At a depth of about 38 inches is light brownish-gray very gravelly coarse sand.

The Cortina soils are near the Garretson, Arbuckle, and Perkins soils.

The Cortina soils are used for dryland pasture, grain, and range, for irrigated citrus, and for homesites.

Cortina gravelly coarse sandy loam, 2 to 8 percent slopes (CnC).—This gently to moderately sloping soil occurs on alluvial fans and in valley fills.

Following is a typical profile on a north-facing slope of 4 percent (100 feet east and 660 feet south of the north quarter corner of section 3, T. 4 S., R. 7 W.):

A1—0 to 10 inches, grayish-brown (10YR 5/2) gravelly coarse sandy loam, very dark grayish brown (10YR 3/2) when moist; massive; slightly hard, friable, nonsticky and nonplastic; abundant, very fine pores and many, irregular, micro pores; neutral (pH 7.0); approximately 30 percent angular to subangular pebbles 3 to 5 millimeters in size; clear, smooth boundary. Horizon is 3 to 10 inches thick.

C1—10 to 23 inches, grayish-brown (10YR 5/2) gravelly sandy loam, dark grayish brown (10YR 4/2) when moist; massive; slightly hard, friable, nonsticky and slightly plastic; plentiful fine roots; few, fine, tubular pores; mildly alkaline (pH 7.5); approximately 20 percent gravel; clear, smooth boundary. Horizon is 5 to 13 inches thick.

C2—23 to 38 inches, grayish-brown (10YR 5/2) very gravelly coarse sandy loam, dark grayish brown (10YR 4/2) when moist; massive; slightly hard, friable, nonsticky and nonplastic; plentiful fine roots; mildly alkaline (pH 7.5); approximately 40 percent gravel; clear, smooth boundary. Horizon is 15 to 30 inches thick.

C3—38 to 60 inches+, light brownish-gray (10YR 6/2) very gravelly coarse sand, dark grayish brown (10YR 4/2) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; mildly alkaline (pH 7.5); approximately 50 percent gravel.

The A horizon is gravelly to very gravelly. The C horizon is light gray to grayish brown to light brownish gray in color. It is very gravelly or very cobbly sandy loam to sand.

Included with this soil in mapping are small areas of Garretson gravelly very fine sandy loam and Arbuckle gravelly loam. Also included are some areas having a gravelly sandy loam surface layer. Some inclusions are affected by streambank erosion and deposition.

Permeability is rapid on this soil, and the available water holding capacity is 3.75 to 5.0 inches. Drainage is somewhat excessive. Runoff is slow to medium, and the erosion hazard is slight to moderate. The root zone is more than 60 inches deep. Natural fertility is low.

This soil is used for dryland pasture, grain, and range, for irrigated citrus, and for homesites. (Capability unit IIIs-4 (19) irrigated; Sandy range site)

Cortina gravelly loamy sand, 2 to 8 percent slopes (ClC).—The profile of this soil is similar to that described for the Cortina series, but it has a gravelly loamy sand surface layer. The soil is crossed by braided stream channels and is subject to overflow.

This soil is excessively drained and has rapid permeability. The available water holding capacity is 3.0 to 4.5 inches. Runoff is slow to medium, and the hazard of erosion is high. Natural fertility is low.

This soil is used for range. (Capability unit VIIw-4 (19) dryland; Sandy Alluvial range site)

Cortina cobbly loamy sand, 2 to 8 percent slopes (CmC).—The profile of this soil is similar to that described for the Cortina series, but it has a cobbly loamy sand surface layer and is lighter in color. This soil is affected by stream channel erosion and deposition.

A few small areas mapped as this soil have a cobbly sandy loam surface layer and are slightly to moderately eroded.

This excessively drained soil has rapid permeability and rapid runoff. The available water holding capacity is 2.5 to 4.0 inches. The hazard of erosion is high because of overflow from the shallow stream channels. Natural fertility is low.

This soil is used for range. (Capability unit VIIw-4 (19) dryland; Sandy Alluvial range site)

Cortina sandy loam, 0 to 2 percent slopes (CoA).—The profile of this soil is similar to that described for the Cortina series, but it has a light-gray or gray gravelly coarse sand layer at a depth of 20 to 36 inches. There is no significant gravel content in the surface layer, although some areas with a gravelly surface layer are included with this soil in mapping.

Runoff on this soil is slow, and the hazard of erosion is slight. The substratum is very rapidly permeable. Natural fertility is low.

This soil is used for dryland pasture, grain, and range and for homesites. In climatically favorable locations, the soil areas are used for irrigated citrus. (Capability unit IIIs-0 (19) irrigated; Sandy range site)

Cortina gravelly sandy loam, 0 to 2 percent slopes (CpA).—The profile of this soil is similar to that described for the Cortina series, but it has very rapidly permeable gravelly coarse sand at a depth of 10 to 20 inches. A few areas of shallow loamy sand are included.

The available water holding capacity of this soil is 2.0 to 3.0 inches. This excessively drained soil has low natural fertility. Runoff is slow, and the hazard of erosion is slight.

This soil is used for dryland pasture, grain, and range and for homesites. (Capability unit IVs-0 (19) irrigated; Sandy range site)

Cortina cobbly sandy loam, 2 to 12 percent slopes (CrD).—The profile of this soil is similar to that described for the Cortina series, but it has a cobbly sandy loam surface layer and shows less stratification throughout its profile.

Included in mapping are a few small areas having slopes of 12 to 25 percent. Also included are areas having a cobbly loam surface layer and areas that are slightly calcareous in the lower layers.

The available water holding capacity of this soil is 4.5 to 6.0 inches. Permeability is rapid. Runoff is slow to medium, and the hazard of erosion is slight to moderate.

This soil is used for irrigated citrus, for dryland pasture and range, and for homesites. (Capability unit IVs-4 (19) irrigated; Sandy range site)

Crafton Series

Soils of the Crafton series are well drained, are on uplands, and have slopes of 15 to 50 percent. These soils formed in material from metamorphic rock—gneiss and schist. Elevations range from 3,500 to 6,000 feet. The average annual rainfall ranges from 17 to 30 inches, the average annual temperature from 52° to 57° F., and the average frost-free season from 150 to 250 days. The vegetation is chiefly annual grasses, shrubs, and scrub oaks.

In a typical profile, the surface layer is brown to dark yellowish-brown sandy loam about 26 inches thick. The underlying material is light yellowish-brown, weathered rock with fractures and cleavage planes.

Crafton soils are near the Mottsville, Oak Glen, Calpine, and Bull Trail soils and near Rough broken land.

Crafton soils are used for dryland pasture and range and for nonfarm purposes.

Crafton rocky sandy loam, 25 to 50 percent slopes, eroded (CsF2).—This steep soil occurs on uplands. Rock outcrops occupy 2 to 10 percent of the surface.

Following is a typical profile on a northeast-facing slope of 35 percent (300 feet north and 1,400 feet west of the east quarter corner of section 27, T. 2 S., R. 1 E.):

O—½ inch to 0, partly decomposed brush litter.
A11—0 to 10 inches, brown to dark-brown (10YR 4/3) micaceous sandy loam, dark brown (10YR 3/3) when moist; weak, fine, crumb structure; soft, very friable, nonsticky and nonplastic; abundant very fine and fine roots; many, very fine, irregular pores; medium acid (pH 6.0); gradual, smooth boundary. Horizon is 6 to 10 inches thick.
A12—10 to 18 inches, brown to dark-brown (10YR 4/3) micaceous sandy loam, dark brown (10YR 3/3) when moist; weak, fine, crumb structure; soft, very friable, nonsticky and nonplastic; plentiful fine and medium roots; common, very fine, irregular pores; medium acid (pH 6.0); gradual, smooth boundary. Horizon is 8 to 14 inches thick.
A13—18 to 26 inches, dark yellowish-brown (10YR 4/4) stony micaceous sandy loam, dark yellowish brown (10YR 3/4) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few medium and coarse roots; medium acid (pH 6.0); approximately 25 percent stones; abrupt, irregular boundary. Horizon is 6 to 12 inches thick.
C—26 inches, light yellowish-brown (10YR 6/4), partly weathered micaceous schist, yellowish brown (10YR 5/4) when moist; few medium roots in rock fractures and cleavage planes.

The A horizon is sandy loam to fine sandy loam in texture. The C horizon is slightly acid to medium acid. It ranges in color from light gray to grayish brown to light yellowish brown. Depth to the weathered gneiss and mica-schist commonly ranges from 20 to 36 inches.

Included with this soil in mapping are small areas of Oak Glen fine sandy loam, Mottsville loamy sand, and Rough broken land. Some areas that have a stony sandy loam surface layer are also included.

Permeability of this soil is moderately rapid. The available water holding capacity is 1.5 to 3.0 inches. Runoff is rapid, and the hazard of erosion is high. The root zone is 20 to 36 inches deep. Natural fertility is low.

The soil is used for dryland pasture and range and for nonfarm purposes. (Capability unit VIe-7 (20) dryland; Loamy Uplands range site)

Crafton fine sandy loam, 15 to 35 percent slopes, eroded (CtF2).—The profile of this soil is similar to that described for the Crafton series, but it has a dark-brown fine sandy loam surface layer. This soil is free or nearly free of rock outcrops. Included in mapping are a few small areas that have a gravelly fine sandy loam surface layer.

The available water holding capacity of this soil is 3.0 to 3.75 inches. Runoff is medium, and the hazard of erosion is moderate. Natural fertility is moderate.

This soil is used for dryland pasture and range and for recreation. (Capability unit VIe-1 (20) dryland; Loamy Uplands range site)

Crafton rocky fine sandy loam, 15 to 25 percent slopes (CuE).—The profile of this soil is similar to that described for the Crafton series, but it has a fine sandy loam surface layer. Rock outcrops cover 2 to 10 percent of the surface. In areas where there are few outcrops, many stones, cobblestones, and pebbles are on the surface.

Runoff on this soil is medium, and the hazard of erosion is moderate.

This soil is used for dryland pasture and range and for recreation. (Capability unit VIe-7 (20) dryland; Loamy Uplands range site)

Crouch Series

The Crouch series consists of well-drained to somewhat excessively drained soils that have slopes of 8 to 50 percent. These soils are on uplands, where they developed on granite and granodiorite. Elevations range from 3,500 to 8,000 feet. The average annual rainfall ranges from 16 to 25 inches, the average annual temperature from 50° to 57° F., and the average frost-free season from 150 to 225 days. The vegetation is chiefly annual grasses, ceanothus, big sagebrush, and Jeffrey and sugar pines.

In a typical profile, the surface layer is dark grayish-brown sandy loam about 11 inches thick. The subsoil is brown sandy loam about 7 inches thick. At a depth of about 18 inches is pale-brown sandy loam. This is underlain by very pale-brown weathered granite at about 28 inches.

The Crouch soils are near the Sheephead, Crafton, Tollhouse, and Mottsville soils.

Crouch soils are used for dryland grain, pasture, and range, for recreation, and as a source of water.

Crouch rocky sandy loam, 25 to 50 percent slopes, eroded (CyF2).—This steep soil is on uplands. Rock outcrops occupy 2 to 10 percent of the surface.

Following is a typical profile on a northwest-facing slope of 35 percent (250 feet east and 200 feet south of the northwest corner of section 26, T. 3 S., R. 1 E.):

O1—¼ inch to 0, dark-gray to very dark gray plant litter.
A11—0 to 5 inches, dark grayish-brown (10YR 4/2) sandy loam, very dark gray (10YR 3/1) when moist; weak, coarse, crumb structure; soft, very friable, nonsticky and nonplastic; abundant very fine roots; many, very fine, irregular pores; slightly acid (pH 6.5); clear, smooth boundary. Horizon is 5 to 11 inches thick.
A12—5 to 11 inches, dark grayish-brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, medium, subangular blocky structure; soft, very friable, nonsticky and nonplastic; abundant, very fine and few fine roots; many, very fine, irregular and few, fine, tubular pores; medium acid (pH 6.0); clear, smooth boundary. Horizon is 5 to 11 inches thick.
B2t—11 to 18 inches, brown (10YR 5/3) sandy loam, brown (10YR 4/3) when moist; weak, medium, subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; plentiful very fine and few fine roots; many, very fine, irregular pores and few, fine, tubular pores; colloid stains and occasional thin bands of colloid clay; medium acid (pH 6.0); gradual, wavy boundary. Horizon is 7 to 12 inches thick.
C1—18 to 28 inches, pale-brown (10YR 6/3) sandy loam, brown (10YR 5/3) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and common fine roots; plentiful, very fine, irregular pores and plentiful, fine, tubular pores; strongly acid (pH 5.5); gradual, irregular boundary. Horizon is 5 to 12 inches thick.
C2—28 inches, very pale brown (10YR 7/3), weathered granite, pale brown (10YR 6/3) when moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine and few medium roots; many, very fine, irregular pores and few, medium, tubular pores; strongly acid (pH 5.5).

The A horizon is slightly acid to medium acid in reaction and dark grayish brown to brown in color. The B horizon is pale brown, brown, or yellowish brown in color. It is coarse sandy loam to sandy loam. The C2 horizon is very pale-brown to yellowish-brown, weathered granite or granodiorite. Depth to weathered granite commonly ranges from 22 to 46 inches.

Included with this soil in mapping are small areas of Tollhouse sandy loam, Crafton fine sandy loam, Sheephead fine sandy loam, Mottsville loamy sand, and Oak Glen fine sandy loam.

This soil is well drained. Its permeability is moderately rapid, and the available water holding capacity is 2.0 to 3.5

inches. Runoff is rapid, and the hazard of erosion is high. The root zone is 22 to 46 inches deep. Natural fertility is low.

The soil is used for range, for recreation, and as a source of water. (Capability unit VIe-7 (20) dryland; Loamy Uplands range site)

Crouch rocky sandy loam, 8 to 25 percent slopes, eroded (CyE2).—Included with this soil in mapping are some small areas that have slopes of 2 to 8 percent. Also included are a few small areas with a rocky loamy sand surface layer.

Runoff on this soil is medium, and the hazard of erosion is moderate.

This soil is used for dryland pasture and range, for recreation, and as a source of water. (Capability unit VIe-7 (20) dryland; Loamy Uplands range site)

Crouch loamy sand, 8 to 15 percent slopes, eroded (CvD2).—The profile of this soil is similar to that described for the Crouch series, but it has a grayish-brown loamy sand surface layer. Less than 2 percent of the surface is occupied by rock outcrops. Included with this soil in mapping are small areas that have slopes of 2 to 8 percent.

The available water holding capacity of this soil is 2.0 to 4.0 inches. Runoff is slow to medium, and the hazard of erosion is slight to moderate. Drainage is somewhat excessive.

This soil is used for dryland grain, pasture, and range and for recreation. (Capability unit IVec-1 (20) dryland; Coarse Sandy range site)

Crouch sandy loam, 8 to 15 percent slopes, eroded (CwD2).—The profile of this soil is similar to that described for the Crouch series, but it has a brown surface layer. Less than 2 percent of the surface is occupied by rock outcrops. Included with this soil in mapping are small areas having slopes of 2 to 8 percent.

Runoff is medium on this soil. The hazard of erosion is moderate.

This soil is used for dryland grain, pasture, and range and for recreation. (Capability unit IVec-1 (20) dryland; Loamy Uplands range site)

Crouch sandy loam, 15 to 25 percent slopes, eroded (CwE2).—The profile of this soil is similar to that described for the Crouch series, but it has a brown surface layer. Rock outcrops occupy less than 2 percent of the surface. Included in mapping is a small area on slopes of 25 to 50 percent.

Runoff on this soil is medium to rapid. The hazard of erosion is moderate to high.

This soil is used for dryland pasture and range and for recreation. Limited areas are used for dryland grain. (Capability unit VIe-1 (20) dryland; Loamy Uplands range site)

Delhi Series

In the Delhi series are somewhat excessively drained soils on dunes and alluvial fans. Slopes range from 0 to 15 percent. These soils developed in granitic material that was reworked by wind. Elevations range from 500 to 1,000 feet. The average annual rainfall ranges from 10 to 13 inches, the average annual temperature from 62° to 65° F., and the average frost-free season from 250 to 310 days. The vegetation is chiefly annual grasses, alfilaria, and flat-top buckwheat.

In a typical profile, the surface layer is light brownish-gray fine sand about 10 inches thick. The underlying material is light brownish-gray and light olive-brown, stratified fine sand, loamy fine sand, and fine sandy loam.

Delhi soils are near the Tujunga, Hanford, and Hilmar soils.

The Delhi soils are used for irrigated truck crops, alfalfa, grapes, and pasture and for homesites.

Delhi fine sand, 2 to 15 percent slopes, wind-eroded (DaD2).—This gently sloping to rolling soil occurs on dunes.

Following is a typical profile on an east-facing slope of 2 percent (50 feet north and 800 feet west of the center of section 7, T. 2 S., R. 6 W.):

Ap—0 to 10 inches, light brownish-gray (10YR 6/2) fine sand, dark grayish brown (10YR 4/2) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; medium acid (pH 5.6); gradual, smooth boundary. Horizon is 7 to 10 inches thick.

C1—10 to 24 inches, light brownish-gray (10YR 6/2) fine sand, dark grayish brown (10YR 4/2) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; medium acid (pH 5.6); few very fine roots; clear, smooth boundary. Horizon is 3 to 40 inches thick.

C2—24 to 48 inches, light olive-brown (2.5Y 5/4) loamy fine sand, olive brown (2.5Y 4/4) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; plentiful very fine and few fine roots; neutral (pH 6.6); gradual, smooth boundary. Horizon is 15 to 40 inches thick.

IIC3—48 to 64 inches, light olive-brown (2.5Y 5/4) fine sandy loam, olive brown (2.5Y 4/4) when moist; massive; slightly hard, very friable, slightly sticky and nonplastic; plentiful very fine and few fine roots; neutral (pH 6.8).

This is wind-modified soil material. It is mostly sand or loamy fine sand to fine sandy loam, but there are very thin discontinuous lenses of silt. The color is light brownish gray to light olive brown and pale brown. The reaction is neutral to medium acid.

Included with this soil in mapping are small areas of Tujunga loamy sand and Hilmar loamy sand. Also included are small areas with a sandy loam substratum.

Permeability of this soil is rapid. The available water holding capacity is 4.5 to 6.5 inches. Runoff is very slow. The hazard of water erosion is slight, but wind erosion is a high hazard. The root zone is more than 60 inches deep. Natural fertility is low.

This soil is used for irrigated truck crops, alfalfa, and grapes and for homesites. (Capability unit IIIe-4 (19) irrigated; Sandy range site)

Delhi loamy fine sand, 0 to 2 percent slopes (DbA).—The profile of this soil is similar to that described for the Delhi series, but it has a pale-brown loamy fine sand surface layer.

Runoff is very slow on this soil. The hazard of water erosion is slight. The available water holding capacity is 5.0 to 7.0 inches. Wind erosion is a moderate hazard.

This soil is used for irrigated truck crops, alfalfa, grapes, and pasture and for homesites. (Capability unit IIe-4 (19) irrigated; Sandy range site)

Dello Series

In the Dello series are somewhat poorly drained to poorly drained soils on alluvial fans and flood plains. Slopes range from 0 to 5 percent. These soils developed in alluvium consisting mainly of granitic material. Elevations range from 600 to 1,800 feet. The average annual rainfall ranges from 11 to 14 inches, the average annual temperature from 61° to 64° F., and the average frost-free season from 200 to 270 days. The vegetation is chiefly

annual grasses, tarweed, willows, and in a few areas, cottonwood trees.

In a typical profile, the surface layer is grayish-brown loamy fine sand about 8 inches thick. Below is light brownish-gray loamy fine sand and light-gray sand, and this material extends to a depth of several feet.

The Dello soils are near the Grangeville, Hanford, and Tujunga soils.

Dello soils are used for dryland pasture and grain, for irrigated alfalfa, and for homesites.

Dello loamy fine sand, 0 to 2 percent slopes (DoA).—This nearly level soil occurs on alluvial fans and flood plains. It generally is slightly saline-alkali.

Following is a typical profile on a southwest-facing slope of 1 percent (1,700 feet northwest of intersection of Redwood Drive and First Street, Riverside, Calif., or 2,100 feet northeast (north 30 degrees east) of Camp Evans in a river bottom):

A1—0 to 8 inches, grayish-brown (2.5YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) when moist; weak, thick, platy structure; soft, very friable, nonsticky and nonplastic; abundant very fine roots; plentiful, very fine, irregular pores; moderately alkaline (pH 8.2); clear, smooth boundary. Horizon is 6 to 13 inches thick.

C1—8 to 15 inches, light brownish-gray (2.5Y 6/2) loamy fine sand, very dark grayish brown (2.5Y 3/2) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; abundant very fine roots; plentiful, very fine, irregular pores; moderately alkaline (pH 8.4); clear, smooth boundary. Horizon is 6 to 11 inches thick.

C2—15 to 32 inches, light-gray (2.5Y 7/2) sand, light brownish gray (2.5Y 6/2) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; abundant very fine and few coarse roots; very porous; moderately alkaline (pH 8.4); clear, smooth boundary. Horizon is 6 to 17 inches thick.

C3—32 to 56 inches, light brownish-gray (2.5Y 6/2) loamy fine sand, very dark grayish brown (2.5Y 3/2) when moist; reddish-brown (5YR 5/4) mottling; single grain; loose when dry or moist, nonsticky and nonplastic; abundant very fine and few medium roots; very porous; moderately alkaline (pH 8.2); clear, smooth boundary. Horizon is 24 to 28 inches thick.

C4—56 to 62 inches, light-gray (2.5Y 7/2) sand, grayish brown (2.5Y 5/2) when moist; mottling; single grain; loose when dry or moist, nonplastic; mildly alkaline (pH 7.5).

The A horizon is loamy fine sand to loamy coarse sand. The C horizons are nonsaline-alkali to slightly saline-alkali. They are chiefly loamy sand to sandy loam, but they include thin layers of silt loam in the lower part. Depth to the water table is commonly greater than 36 inches but may be 10 to 36 inches in some places.

Included with this soil in mapping are small areas of Grangeville sandy loam, Tujunga loamy sand, and Hanford fine sandy loam.

This is a somewhat poorly drained soil. Its permeability is moderately rapid to rapid. The available water holding capacity is 5.0 to 7.0 inches. Runoff is very slow, and the hazard of erosion is slight. The root zone is greater than 60 inches deep but may be restricted by the water table. Natural fertility is moderate.

This soil is used for irrigated pasture, alfalfa, and grain and for homesites. (Capability unit IIIw-4 (19) irrigated; Sandy range site)

Dello loamy sand, 0 to 5 percent slopes (DgB).—The profile of this soil is similar to that described for the Dello series, but it has a loamy sand texture throughout.

Included in mapping are small areas of deep loamy sand that is 24 to 42 inches thick over gravelly coarse sand. Also included are areas of gravelly loamy sand that are moderately saline-alkali. Some included areas consist of eroded stream channels.

The available water holding capacity of this soil is 4.5 to 5.5 inches. Runoff is slow, and the hazard of erosion is slight.

This soil is used for irrigated grain, pasture, and alfalfa and for homesites. (Capability unit IIIw-4 (19) irrigated; Sandy range site)

Dello loamy sand, poorly drained, 0 to 2 percent slopes (DmA).—The profile of this soil is similar to that described for the Dello series, but it is loamy sand 15 to 42 inches deep over gravelly coarse sand. The water table is at a depth of 10 to 36 inches, and the soil is subject to overflow and deposition.

Included with this soil in mapping are small areas of a Dello loamy sand that is very deep and has higher available water holding capacity than this soil; some areas of a loamy sand that is only 10 to 15 inches deep over gravelly coarse sand; and small areas of moderately saline-alkali soils.

This soil has an available water holding capacity of 1.5 to 4.5 inches. Permeability is rapid to very rapid. Runoff is very slow, and the hazard of erosion is slight. Natural fertility is low to very low.

This soil is used for range and for nonfarm purposes. (Capability unit VIIw-4 (19) dryland; Sandy Alluvial range site)

Dello loamy sand, gravelly substratum, 0 to 5 percent slopes (DnB).—The profile of this soil is similar to that described for the Dello series, but it consists of 15 to 24 inches of loamy sand over gravelly coarse sand. Included in mapping are areas of eroded stream channels. Also included are moderately saline-alkali areas.

The available water holding capacity of this soil is 2.0 to 3.5 inches. Runoff is very slow, and the hazard of erosion is slight. Natural fertility is very low.

This soil is used for irrigated grain, pasture, and alfalfa and for homesites. (Capability unit IVw-0 (19) irrigated; Sandy range site)

Dello loamy fine sand, saline-alkali, 0 to 5 percent slopes (DpB).—The profile of this soil is similar to that described for the Dello series, but it is saline-alkali and has a loamy substratum. Included with this soil in mapping are areas with a water table at a depth of 36 to 48 inches. Also included are strongly saline-alkali areas.

The permeability of this soil is moderately rapid. The root zone is more than 60 inches deep.

This soil is used for irrigated alfalfa and pasture and for homesites. (Capability unit IIIw-6 (19) irrigated; Sandy range site)

Dello loamy fine sand, gravelly substratum, 0 to 2 percent slopes (DrA).—The profile of this soil is similar to that described for the Dello series, but it is 24 to 42 inches deep over gravelly coarse sand.

Included with this soil in mapping are some areas with a water table at a depth of 36 to 48 inches. Also included are areas that are 40 to 54 inches deep over gravelly coarse sand. A small area of stream channel erosion and deposition is also included, as are some small areas of moderately saline-alkali Dello soils.

The available water holding capacity of this soil is 3.75 to 5.0 inches. Runoff is very slow, and the hazard of erosion is slight. Natural fertility is low.

This soil is used for irrigated pasture, grain, and alfalfa and for homesites. (Capability unit IIIw-0 (19) irrigated; Sandy range site)

Domino Series

The Domino series consists of moderately well drained to somewhat poorly drained soils in basins and on alluvial fans. Slopes range from 0 to 2 percent. These soils formed in alluvium from granitic materials. Elevations range from 600 to 1,600 feet. The average annual rainfall ranges from 10 to 13 inches, the average annual temperature from 62° to 65° F., and the average frost-free season from 230 to 280 days. The vegetation is chiefly annual grasses and forbs.

In a typical profile, the surface layer is grayish-brown silt loam about 14 inches thick. Below this is light brownish-gray silt loam and silty clay loam. At a depth of about 27 inches is a hardpan that is strongly cemented lime in the uppermost part. The cementation weakens with depth. The weaker part of the pan breaks down to a loam. The profile is generally slightly to strongly saline-alkali.

Domino soils are near the Chino and Willows soils.

The Domino soils are used for dryland grain and pasture and for irrigated alfalfa, permanent pasture, and grain. They are also used for homesites and recreation.

Domino silt loam, saline-alkali (0 to 2 percent slopes) (Dv).—This nearly level soil occurs on alluvial fans and in basins.

Following is a typical profile on a southeast-facing slope of 1 percent (1,650 feet east and 50 feet south of the northwest corner of section 20, T. 4 S., R. 3 W.):

Ap—0 to 7 inches, grayish-brown (2.5Y 5/2) silt loam, dark grayish brown (2.5Y 4/2) when moist; massive; slightly hard, friable, nonsticky and nonplastic; plentiful fine roots; many, very fine, irregular pores; moderately alkaline (pH 8.0); violently effervescent; clear, smooth boundary. Horizon is 3 to 8 inches thick.

A1—7 to 14 inches, grayish-brown (2.5Y 5/2) silt loam, dark grayish brown (2.5Y 4/2) when moist; massive; slightly hard, friable, sticky and slightly plastic; plentiful fine roots; common, fine, tubular pores; moderately alkaline (pH 8.0); violently effervescent; abrupt, smooth boundary. Horizon is 5 to 12 inches thick.

C1—14 to 22 inches, light brownish-gray (2.5Y 6/2) heavy silt loam, grayish brown (2.5Y 5/2) when moist; massive; slightly hard, friable, sticky and slightly plastic; plentiful fine roots; common, fine, tubular pores; moderately alkaline (pH 8.0); violently effervescent; clear, smooth boundary. Horizon is 8 to 16 inches thick.

C2—22 to 27 inches, light brownish-gray (2.5Y 6/2) light silty clay loam, grayish brown (2.5Y 5/2) when moist; massive; slightly hard, friable, sticky and slightly plastic; few fine roots; common, fine, tubular pores; moderately alkaline (pH 8.0); violently effervescent; clear, smooth boundary. Horizon is 4 to 12 inches thick.

C3cam—27 to 36 inches, light-gray (2.5Y 7/2) strongly cemented caliche, dark grayish brown (2.5Y 4/2) when moist; moderately alkaline (pH 8.0); abrupt, smooth boundary. Horizon is 2 to 9 inches thick.

C4ca—36 to 42 inches, white (5Y 8/2) heavy loam, light olive gray (5Y 6/2) when moist; massive, slightly hard, friable, slightly sticky and slightly plastic; moderately alkaline (pH 8.0); violently effervescent; abrupt, smooth boundary. Horizon is 6 to 14 inches thick.

C5ca—42 to 51 inches, white (5Y 8/2), weakly cemented sandy loam, light olive gray (5Y 6/2) when moist; massive and platy; extremely hard, nonsticky and nonplastic; moderately alkaline (pH 8.0); abrupt, smooth boundary. Horizon is 8 to 10 inches thick.

C6—51 to 63 inches, white (5Y 8/2) loam, light olive gray (5Y 6/2) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; moderately alkaline (pH 8.0); violently effervescent.

The A horizon is moderately to strongly alkaline and moderately to violently effervescent. It is loam to silt loam in texture. The C1 and C2 horizons are generally moderately to strongly alkaline in reaction and silt loam to silty clay loam in texture. The C3cam horizon, or caliche hardpan, is white to light gray and contains a strongly cemented surface crust. Cementation below the crust weakens with depth. Depth to the hardpan ranges from 20 to 42 inches.

Included with this soil in mapping are small areas of Chino silt loam and Willows silty clay. Also included are areas that are 10 to 20 inches deep to the hardpan. Some small included areas have a water table at a depth of 36 to 42 inches.

This moderately well drained soil is slowly permeable above the nearly impervious pan. Runoff is slow, and the hazard of erosion is slight. The available water holding capacity is 4.0 to 7.0 inches. The root zone is generally 20 to 42 inches deep. Natural fertility is moderate.

This soil is used for irrigated grain and alfalfa and for recreation. (Capability unit IIIs-6 (19) irrigated; Silty Basin range site)

Domino fine sandy loam, eroded (0 to 2 percent slopes) (Ds2).—This soil has a profile similar to that described for the Domino series, but it has a fine sandy loam surface layer and is not saline-alkali. Wind erosion is indicated by the buildup of soil material along field edges, by differences in elevation of 12 to 15 inches across irrigation lines, and by deposits of soil material in fence lines, in areas of old vegetation, and along tree rows.

Included with this soil in mapping are a few areas that are 42 to 54 inches deep to the hardpan.

Runoff on this soil is slow to medium, and the hazard of water erosion is slight to moderate. The available water holding capacity is 3.0 to 6.0 inches. Natural fertility is high.

This soil is used for dryland grain and pasture, for irrigated alfalfa, and for homesites and recreation. (Capability unit IIIe-8 (19) irrigated; Sandy Basin range site)

Domino fine sandy loam, saline-alkali (0 to 2 percent slopes) (Dt).—This soil has a profile similar to that described for the Domino series, but it has a fine sandy loam surface layer. Included with this soil in mapping are a few small areas that are 10 to 20 inches to the hardpan and others that are 42 to 54 inches to the hardpan. Some small areas of strongly saline-alkali soils are also included.

The available water holding capacity of this soil is 4.0 to 6.0 inches. Runoff is very slow, and the hazard of erosion is none to slight.

This soil is used for dryland grain and pasture, for irrigated alfalfa and permanent pasture, and for recreation. (Capability unit IIIs-6 (19) irrigated; Sandy Basin range site)

Domino silt loam (0 to 2 percent slopes) (Du).—The profile of this soil is similar to that described for the Domino series, but it is not saline-alkali. A few small areas with a water table at 30 to 36 inches are included.

The available water holding capacity of this soil is 4.0 to 7.0 inches. Runoff is slow, and the hazard of erosion is slight. Natural fertility is high.

This soil is used for dryland grain and for irrigated alfalfa. It is also used for homesites and recreation. (Capability unit IIIs-8 (19) irrigated; Silty Basin range site)

Domino silt loam, strongly saline-alkali (0 to 2 percent slopes) (Dw).—This soil has a profile similar to that described for the Domino series, but it is strongly saline-alkali and has a silty clay loam substratum. Included with this soil in mapping are a few small areas that are very strongly saline-alkali. Also included are a few small areas that are 42 to 54 inches deep to the hardpan.

The available water holding capacity of this soil is 4.0 to 7.0 inches. Drainage is somewhat poor. Runoff is very slow, and the hazard of erosion is slight. A water table occurs at a depth of 36 to 60 inches. Natural fertility is low.

This soil is used for irrigated grain and pasture and for recreation. (Capability unit IVw-6 (19) irrigated; Silty Basin range site)

Escondido Series

In the Escondido series are well-drained soils on uplands. Slopes range from 2 to 50 percent. These soils developed in metamorphosed fine-grained sandstone and schist. Elevations range from 1,000 to 2,800 feet. The average annual rainfall ranges from 10 to 13 inches, the average annual temperature from 62° to 65° F., and the average frost-free season from 230 to 280 days. The vegetation is chiefly annual grasses, forbs, salvia, and chaparral.

In a typical profile, the surface layer is brown fine sandy loam and very fine sandy loam about 11 inches thick. The subsoil is brown very fine sandy loam. At a depth of about 34 inches is weathered, metamorphosed, fine-grained sandstone and schist.

The Escondido soils are near the Friant, Lodo, Vallecitos, Vista, and Fallbrook soils.

Escondido soils are used for dryland grain, pasture, and range and for irrigated citrus and alfalfa.

Escondido fine sandy loam, 8 to 15 percent slopes, eroded (EcD2).—This rolling soil is on uplands.

Following is a typical profile on a northwest-facing slope of 14 percent (350 feet west and 100 feet south of the north quarter corner of section 15, T. 7 S., R. 2 W.):

Ap—0 to 5 inches, brown (10YR 5/3) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, medium, subangular blocky structure; soft, very friable, nonsticky and slightly plastic; few medium and abundant very fine roots; few, medium, tubular pores; medium acid (pH 5.6); clear, smooth boundary. Horizon is 4 to 10 inches thick.

A1—5 to 11 inches, brown (10YR 5/3) very fine sandy loam, dark brown (10YR 3/3) when moist; weak, medium, subangular blocky structure; soft, very friable, nonsticky and slightly plastic; plentiful very fine roots; many, very fine, tubular pores; medium acid (pH 5.6); clear, smooth boundary. Horizon is 4 to 8 inches thick.

B1—11 to 15 inches, brown (10YR 5/3) very fine sandy loam, dark brown (10YR 3/3) when moist; moderate, medium, subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; abundant very fine roots; few, fine and many, very fine, tubular pores; medium acid (pH 6.0); clear, smooth boundary. Horizon is 4 to 10 inches thick.

B2—15 to 29 inches, brown (10YR 5/3) very fine sandy loam, dark brown (10YR 3/3) when moist; moderate, coarse, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; abundant very fine exped roots; few, very fine, tubular pores; slightly acid (pH 6.5); clear, smooth boundary. Horizon is 8 to 16 inches thick.

B3—29 to 34 inches, brown (10YR 5/3) very fine sandy loam, dark brown (10YR 3/3) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; abundant very fine roots; many, very fine, tubular pores; slightly acid (pH 6.5); abrupt, irregular boundary. Horizon is 4 to 6 inches thick.

R—34 inches, metamorphosed, fine-grained sandstone; abundant very fine roots in fracture planes; slightly acid (pH 6.5).

The A horizon is slightly acid to medium acid in reaction, brown to yellowish brown in color, and fine sandy loam to loam in texture. The B horizon is generally slightly acid to medium acid, brown to yellowish-brown fine sandy loam to loam. Depth to the weathered, fine-grained, metamorphosed sandstone and schist commonly ranges from 24 to 50 inches.

Included with this soil in mapping are small areas of Friant fine sandy loam, Lodo gravelly loam, Vallecitos loam, Vista coarse sandy loam, Fallbrook sandy loam, and Fallbrook rocky sandy loam.

This soil has moderate permeability. Runoff is medium, and the hazard of erosion is moderate. The available water holding capacity is 3.75 to 8.0 inches. The root zone is 24 to 50 inches deep. Natural fertility is moderate.

This soil is used for dryland grain, pasture, and range. (Capability unit IVe-8 (19) irrigated; Loamy range site)

Escondido fine sandy loam, 2 to 8 percent slopes, eroded (EcC2).—Included with this soil in mapping are a few small areas of Fallbrook fine sandy loam.

Runoff is slow on this soil, and the hazard of erosion is slight.

This soil is used mainly for dryland grain, pasture, and range. A few small areas are used for irrigated alfalfa and citrus. (Capability unit IIIe-8 (19) irrigated; Loamy range site)

Escondido fine sandy loam, 15 to 25 percent slopes, eroded (EcE2).—The profile of this soil is similar to that described for the Escondido series, but it has a yellowish-brown surface layer. This soil is crossed by actively cutting drainages and gullies that generally are entrenched to bedrock. Included in mapping are a few small areas of Fallbrook fine sandy loam.

Runoff is rapid on this soil, and the hazard of erosion is high.

This soil is used for dryland pasture and range. (Capability unit VIe-8 (19) dryland; Loamy range site)

Escondido rocky fine sandy loam, 8 to 50 percent slopes, eroded (EfF2).—The profile of this soil is similar to that described for the Escondido series, but it is 24 to 36 inches deep to weathered metamorphosed sandstone. Rock outcrops cover 2 to 10 percent of the surface. Included in mapping are a few small areas in which less than 2 percent of the surface is occupied by rock outcrops.

The available water holding capacity of this soil is 3.75 to 6.0 inches. Runoff is medium to rapid, and the hazard of erosion is moderate to high. Natural fertility is moderately low.

This soil is used for range and as a source of water. (Capability unit VIe-8 (19) dryland; Loamy range site)

Exeter Series

Soils of the Exeter series have slopes of 0 to 8 percent, and they lie in basins and on alluvial fans. These well-

drained soils developed in alluvium from moderately coarse granitic materials. Elevations range from 600 to 1,700 feet. The average annual rainfall ranges from 10 to 14 inches, the average annual temperature from 61° to 64° F., and the average frost-free season from 230 to 280 days. The vegetation is chiefly annual grasses and forbs.

In a typical profile, the surface layer is brown sandy loam about 16 inches thick. The subsoil is brown heavy loam. At a depth of about 37 inches is an indurated silica hardpan. The cementation of the hardpan decreases with depth.

The Exeter soils are near the Greenfield, Ramona, and Monserate soils.

Exeter soils are used for dryland grain and pasture, for irrigated alfalfa, potatoes, and truck crops, and for homesites.

Exeter sandy loam, 0 to 2 percent slopes (EnA).—This nearly level soil occurs in basins.

Following is a typical profile on a west-facing slope of 1 percent (1,200 feet west and 400 feet south of the north quarter corner of section 16, T. 4 S., R. 3 W.):

Ap—0 to 10 inches, brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) when moist; weak, fine, granular structure; hard, friable, nonsticky and nonplastic; abundant roots; many pores; medium acid (pH 5.7); abrupt, smooth boundary. Horizon is 4 to 10 inches thick.

A3—10 to 16 inches, brown (10YR 4/3) sandy loam, dark brown (10YR 3/3) when moist; moderate, medium, angular blocky and weak, fine, granular structure; hard, friable, nonsticky and slightly plastic; abundant roots; many pores; slightly acid (pH 6.5); gradual, smooth boundary. Horizon is 4 to 8 inches thick and may be a tillage pan.

B21t—16 to 25 inches, brown (7.5YR 5/4) heavy loam, dark brown (7.5YR 3/2) when moist; strong, medium, angular blocky structure; very hard, firm, slightly sticky and plastic; plentiful roots; many pores; few weak clay films; a few manganese stains; neutral (pH 7.3); gradual, smooth boundary. Horizon is 8 to 10 inches thick.

B22t—25 to 30 inches, brown (7.5YR 5/4) heavy loam, dark brown (7.5YR 3/2) when moist; strong, medium, angular blocky structure; very hard, firm, sticky and plastic; plentiful roots; many pores; few weak clay films; a few manganese stains; neutral (pH 7.2); abrupt, wavy boundary. Horizon is 4 to 10 inches thick.

B3ca—30 to 37 inches, brown (7.5YR 5/4) heavy loam, dark brown (7.5YR 3/2) when moist; massive; extremely hard, extremely firm, slightly sticky and slightly plastic; few roots; many pores; moderately thick clay films in fractures; a few manganese stains; moderately alkaline (pH 8.1); strongly effervescent; lime occurs in seams; slight mottling just above lower boundary; gradual, wavy boundary. Horizon is 4 to 12 inches thick.

C1sim—37 to 50 inches, brown (7.5YR 5/4) indurated hardpan cemented with silica, dark brown (7.5YR 3/2) when moist; massive; moderately alkaline (pH 8.2); slightly effervescent; lime occurs in seams; diffuse, irregular boundary. Horizon is 5 to 16 inches thick.

C2ca—50 to 60 inches, brown (7.5YR 5/4) coarse sandy loam, dark brown (7.5YR 3/2) when moist; massive; very hard, very fine, slightly sticky and slightly plastic; many pores, mildly alkaline (pH 7.8); slightly effervescent in seams.

The A horizon is slightly acid to medium acid in reaction, brown to yellowish brown in color, and sandy loam to fine sandy loam in texture. The Bt horizon is neutral to moderately alkaline in reaction, brown to grayish brown in color, and very fine sandy loam to clay loam in texture. The Cm horizon is mildly to strongly alkaline and slightly to strongly effervescent. The cementation of the Cm horizon decreases with depth. Depth to the silica-cemented hardpan commonly ranges from 20 to 37 inches, but may be as great as 54 inches in some Exeter soils.

Included with this soil in mapping are small areas of Greenfield sandy loam, Ramona sandy loam, and Monserate sandy loam. Also included are some areas where erosion and deposition have occurred along streambanks.

The permeability of this soil is moderate, and the available water holding capacity is 3.75 to 5.0 inches. Runoff is slow, and the hazard of erosion is slight. The root zone is 20 to 36 inches deep. Natural fertility is moderate.

This soil is used for irrigated alfalfa, potatoes, and truck crops, for dryland pasture, and for homesites. (Capability unit IIIs-8 (19) irrigated; Loamy range site)

Exeter sandy loam, 2 to 8 percent slopes, eroded (EnC2).—Erosion on this soil is indicated by a 12- to 15-inch drop of irrigation pipelines across fields, by washing or deposition in dead furrows, by short gullies cut through the edges of fields, and by rills formed in summer-fallow fields after a rain. Deposition occurs in natural drains where the slope decreases.

Included with this soil in mapping are a few areas with light clay loam subsoil. Also included is a very small acreage where slopes are 8 to 15 percent.

Runoff on this soil is slow to medium, and the hazard of erosion is slight to moderate.

This soil is used for irrigated alfalfa, potatoes, and truck crops, for dryland pasture and grain, and for homesites. (Capability unit IIIe-8 (19) irrigated; Loamy range site)

Exeter sandy loam, slightly saline-alkali, 0 to 5 percent slopes (EoB).—The profile of this soil is similar to that described for the Exeter series, but it has slight concentrations of sodium salts. Included with this soil in mapping are a few small areas that are 36 to 54 inches deep to the hardpan. Also included are eroded areas and areas with a light clay loam subsoil.

The available water holding capacity of this soil is 5.0 to 6.5 inches. Runoff is slow, and the hazard of erosion is slight.

This soil is used for irrigated truck crops, alfalfa, and potatoes, for dryland grain, and for homesites. (Capability unit IIIs-6 (19) irrigated; Loamy range site)

Exeter sandy loam, deep, 0 to 2 percent slopes (EpA).—The profile of this soil is similar to that described for the Exeter series, but it is 36 to 54 inches deep to the hardpan.

Included with this soil in mapping are a few small areas with a heavy sandy loam or a light clay loam subsoil. Also included are a few small areas of slightly saline-alkali Exeter soils near the basin rim. Some included areas have slopes of 2 to 5 percent.

The available water holding capacity of this soil is 5.0 to 7.5 inches. Runoff is slow, and the hazard of erosion is slight. The root zone is 36 to 54 inches deep. Natural fertility is high.

This soil is used for irrigated alfalfa, potatoes, and truck crops, for dryland grain, and for homesites. (Capability unit IIs-8 (19) irrigated; Loamy range site)

Exeter sandy loam, deep, 2 to 8 percent slopes, eroded (EpC2).—The profile of this soil is similar to that described for the Exeter series, but it is 36 to 54 inches deep to the hardpan. Erosion on this soil is indicated by washing or deposition in dead furrows and by the elevation

drop of 12 to 15 inches across an irrigation pipeline. Short gullies cut the edges of fields, and rills form in summer-fallow fields after a rain.

Included with this soil in mapping are a few small areas of Exeter soils that have a heavy sandy loam or light clay loam subsoil. Also included are small uneroded areas.

The available water holding capacity of this soil is 5.0 to 7.5 inches. Runoff is slow to medium, and the hazard of erosion is slight to moderate. The root zone is 36 to 54 inches deep. Natural fertility is high.

This soil is used for irrigated alfalfa, potatoes, and truck crops, for dryland grain and pasture, and for homesites. (Capability unit IIe-1 (19) irrigated; Loamy range site)

Exeter very fine sandy loam, 0 to 5 percent slopes (EwB).—The profile of this soil is similar to that described for the Exeter series, but it has a very fine sandy loam surface layer. Included in mapping is a very small area where the depth to the hardpan is 10 to 20 inches. Also included are a few small areas with a light clay loam subsoil.

Runoff on this soil is slow to medium, and the hazard of erosion is slight to moderate. The available water holding capacity is 4.0 to 5.5 inches.

This soil is used for irrigated alfalfa, truck crops, and potatoes, for dryland grain and pasture, and for homesites. (Capability unit IIIe-8 (19) irrigated; Loamy range site)

Exeter very fine sandy loam, deep, 0 to 5 percent slopes (EyB).—The profile of this soil is similar to that described for the Exeter series, but it has a very fine sandy loam surface layer and is 36 to 54 inches deep to the hardpan. Included with this soil in mapping are a few small areas that have a light clay loam subsoil. Small eroded areas are also included.

The available water holding capacity of this soil is 5.5 to 8.0 inches. Runoff is slow to medium, and the hazard of erosion is slight to moderate. The root zone is 36 to 54 inches deep. Natural fertility is high.

This soil is used for irrigated alfalfa, truck crops, and potatoes, for dryland pasture, and for homesites. (Capability unit IIe-1 (19) irrigated; Loamy range site)

Fallbrook Series

The Fallbrook series consists of well-drained soils that lie on uplands and have slopes of 2 to 50 percent. These soils developed on granodiorite and tonalite. Elevations range from 700 to 3,500 feet. The average annual rainfall ranges from 10 to 14 inches, the average annual temperature from 59° to 65° F., and the average frost-free season from 200 to 280 days. The vegetation is chiefly annual grasses, oaks, flat-top buckwheat, and chaparral.

In a typical profile, the surface layer is brown sandy loam about 14 inches thick. The subsoil is reddish-brown sandy clay loam. At a depth of about 24 inches is weathered tonalite.

The Fallbrook soils are near the Cieneba, Vista, Bonsall, and Monserate soils.

The Fallbrook soils are used for dryland pasture and grain, for irrigated citrus, alfalfa, and grain, and for homesites.

Fallbrook sandy loam, 8 to 15 percent slopes, eroded (FaD2).—This rolling soil occurs on uplands.

Following is a typical profile on a southeast-facing slope of 9 percent (1,600 feet north and 650 feet east of the south quarter corner of section 20, T. 3 S., R. 4 W.):

A1—0 to 7 inches, brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) when moist; weak, medium and fine, granular structure; soft, very friable, nonsticky and nonplastic; abundant fine and very fine roots; many, fine, irregular pores; slightly acid (pH 6.5); clear, smooth boundary. Horizon is 3 to 16 inches thick.

A3—7 to 14 inches, brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; plentiful fine and very fine roots; many, fine, irregular pores; neutral (pH 7.0); clear, smooth boundary. Horizon is 3 to 7 inches thick.

B2t—14 to 20 inches, reddish-brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) when moist; strong, coarse, subangular blocky structure; very hard, very firm, very sticky and plastic; plentiful fine and very fine exped roots; common, fine, irregular pores; common moderately thick clay films on ped faces; neutral (pH 7.0); gradual, smooth boundary. Horizon is 5 to 14 inches thick.

B3t—20 to 24 inches, reddish-brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) when moist; strong, coarse, subangular blocky structure; very hard, very firm, very sticky and plastic; plentiful fine roots; common, fine, irregular pores; common thin clay films on ped faces and in pores; many angular quartz and feldspar fragments that range from white to reddish yellow (5YR 6/6) in color, range up to one-quarter inch in diameter, and become more numerous with depth; neutral (pH 7.0); gradual, irregular boundary. Horizon is 4 to 18 inches thick.

C—24 inches, weathered granitic rock (Woodson Mt. tonalite); becomes slightly harder with depth.

The A horizon is slightly acid to neutral in reaction and dark brown, brown, or yellowish brown in color. The Bt horizon is reddish brown to dark brown or yellowish red in color and loam to clay loam or sandy clay loam in texture. The C horizon is slightly acid to neutral, light brownish-yellow to dark-gray, weathered granodiorite or tonalite. Depth to the weathered rock commonly ranges from 20 to 36 inches but may be as shallow as 10 inches in some Fallbrook soils.

Included with this soil in mapping are small areas of Cieneba sandy loam, Vista coarse sandy loam, Bonsall fine sandy loam, Monserate sandy loam, and Buren fine sandy loam.

Permeability of this soil is moderate. Runoff is medium, and the hazard of erosion is moderate. The available water holding capacity is 4.0 to 7.0 inches. The root zone is 20 to 36 inches deep. Natural fertility is moderate.

This Fallbrook soil is used for dryland grain and pasture, for irrigated citrus, and for homesites. (Capability unit IVe-1 (19) irrigated; Loamy range site)

Fallbrook sandy loam, 15 to 25 percent slopes, eroded (FaE2).—Included with this soil in mapping are small areas that are more than 36 inches deep to weathered rock. Some areas with a fine sandy loam surface layer are also included.

Runoff is rapid on this soil, and the hazard of erosion is high.

This soil is used for dryland grain and pasture, for irrigated citrus, and for homesites. (Capability unit VIe-1 (19) dryland; Loamy range site)

Fallbrook sandy loam, shallow, 5 to 8 percent slopes, eroded (FbC2).—The profile of this soil is similar to that described for the Fallbrook series, but it is 10 to 20 inches deep to weathered rock. Included with this soil in mapping are a few small areas that have slopes of 2 to 5 percent.

The available water holding capacity of this soil is 2.0 to 3.0 inches. Runoff is medium, and the hazard of erosion is moderate. Natural fertility is moderately low.

This soil is used for dryland pasture and grain, for irrigated citrus and alfalfa, and for homesites. (Capability unit IVe-1 (19) irrigated; Shallow Loamy range site)

Fallbrook sandy loam, shallow, 15 to 35 percent slopes, eroded (FbF2).—The profile of this soil is similar to that described for the Fallbrook series, but it is 10 to 20 inches deep to weathered rock. Included in mapping are a few small areas that are 20 to 36 inches deep to weathered rock. Some small included areas have a very fine sandy loam surface layer. Other inclusions are severely eroded.

The available water holding capacity of this soil is 2.0 to 3.0 inches. Runoff is rapid, and the hazard of erosion is high. Natural fertility is moderately low.

This soil is used for range and as a source of water. (Capability unit VIIe-1 (19) dryland; Shallow Loamy range site)

Fallbrook rocky sandy loam, shallow, 8 to 15 percent slopes, eroded (FcD2).—The profile of this soil is similar to that described for the Fallbrook series, but it is 10 to 20 inches deep to weathered rock. Rock outcrops occupy 2 to 10 percent of the surface.

Included with this soil in mapping are a few small areas that are 20 to 36 inches deep to weathered rock. Also included are some areas where slopes are 2 to 8 percent.

The available water holding capacity of this soil is 2.0 to 3.0 inches. Runoff is medium, and the hazard of erosion is moderate. Natural fertility is moderately low.

This soil is used for dryland pasture and range and as a source of water. (Capability unit VIe-7 (19) dryland; Shallow Loamy range site)

Fallbrook rocky sandy loam, shallow, 15 to 50 percent slopes, eroded (FcF2).—The profile of this soil is similar to that described for the Fallbrook series, but it is 10 to 20 inches deep to weathered rock. Outcrops of granitic rocks cover 2 to 10 percent of the surface.

Included with this soil in mapping are areas that are 20 to 36 inches deep to weathered rock. Also included are areas having a rocky fine sandy loam surface layer.

The available water holding capacity of this soil is 1.5 to 3.0 inches. Runoff is rapid, and the hazard of erosion is high. Natural fertility is low.

This soil is used for range, for wildlife habitat, and as a source of water. (Capability unit VIIe-1 (19) dryland; Shallow Loamy range site)

Fallbrook fine sandy loam, 2 to 8 percent slopes, eroded (FfC2).—The profile of this soil is similar to that described for the Fallbrook series, but it has a fine sandy loam surface layer. Included with this soil in mapping are a few small areas that are more than 36 inches deep to weathered rock.

Runoff on this soil is slow, and the hazard of erosion is slight. The available water holding capacity is 4.5 to 7.5 inches.

This soil is used for dryland grain and pasture, for irrigated citrus and alfalfa, and for homesites. (Capability unit IIIe-1 (19) irrigated; Loamy range site)

Fallbrook fine sandy loam, shallow, 8 to 15 percent slopes, eroded (FkD2).—The profile of this soil is similar to that described for the Fallbrook series, but it has a fine sandy loam surface layer and is 10 to 20 inches deep to weathered rock. Included with this soil in mapping are a few small areas having a gravelly fine sandy loam or a very fine sandy loam surface layer.

The available water holding capacity of this soil is 2.0 to 3.0 inches. Runoff is medium, and the hazard of erosion is moderate. Natural fertility is moderately low.

This soil is used for dryland grain and pasture, for irrigated citrus, and for homesites. (Capability unit IVe-1 (19) irrigated; Shallow Loamy range site)

Friant Series

In the Friant series are well-drained soils that developed on slightly weathered mica-schist. These soils are on uplands and have slopes of 5 to 50 percent. Elevations range from 800 to 3,000 feet. The average annual rainfall ranges from 10 to 14 inches, the average annual temperature from 59° to 65° F., and the average frost-free season from 210 to 280 days. The vegetation is chiefly annual grasses, forbs, buckwheat, and chaparral. In some areas scattered oaks are in drainageways.

In a typical profile, the surface layer is very dark grayish-brown and brown fine sandy loam about 13 inches thick. Underlying this is weakly weathered mica-schist.

The Friant soils are near the Cieneba, Vista, Escondido, Lodo, and Hanford soils.

Friant soils are used for range and pasture and as a source of water.

Friant rocky fine sandy loam, 25 to 50 percent slopes, eroded (FyF2).—This steep soil occurs on uplands. Rock outcrops occupy 2 to 10 percent of the surface.

Following is a typical profile on a northeast-facing slope of 35 percent (700 feet east and 200 feet north of the southwest corner of section 7, T. 7 S., R. 1 E.):

O1—1/8 inch to 0, decomposed organic matter.

A11—0 to 2 inches, very dark grayish-brown (10YR 3/2) fine sandy loam, very dark brown (10YR 2/2) when moist; weak, fine, crumb structure; slightly hard, very friable, nonsticky and nonplastic; abundant very fine roots; many, very fine, irregular pores; slightly acid (pH 6.2); abrupt, smooth boundary. Horizon is 1 to 3 inches thick.

A12—2 to 9 inches, brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) when moist; moderate, medium, subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few, medium and plentiful, fine and very fine roots; few, medium and common, fine and very fine, tubular pores; neutral (pH 6.7); abrupt, smooth boundary. Horizon is 5 to 10 inches thick.

A13—9 to 13 inches, brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) when moist; moderate, medium, subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few, medium and plentiful, fine and very fine roots; few, medium and many, fine and very fine, tubular pores; neutral (pH 6.6); abrupt, irregular boundary. Horizon is 4 to 7 inches thick.

R—13 inches, mica-schist.

The A horizon is neutral to medium acid in reaction, very dark grayish brown or brown to yellowish brown in color, and sandy loam to fine sandy loam in texture. The R layer is neutral to slightly acid, slightly weathered mica schist that contains roots along the fracture planes. The depth to mica schist commonly ranges from 10 to 20 inches.

Included with this soil in mapping are small areas of Cieneba sandy loam, Vista coarse sandy loam, Escondido fine sandy loam, Lodo gravelly loam, and Hanford sandy loam.

Permeability of this soil is moderately rapid. Runoff is rapid, and the hazard of erosion is high. The available water

holding capacity is 1.0 to 3.0 inches. The root zone is 10 to 20 inches deep. Natural fertility is low.

The soil is used for range and as a source of water. (Capability unit VIIe-1 (19) dryland; Shallow Loamy range site)

Friant rocky fine sandy loam, 8 to 25 percent slopes, eroded (FyE2).—Runoff is medium on this soil, and the hazard of erosion is moderate.

This soil is used for range and as a source of water. (Capability unit VIIe-1 (19) dryland; Shallow Loamy range site)

Friant fine sandy loam, 5 to 25 percent slopes, eroded (FwE2).—In areas mapped as this soil, rock outcrops cover less than 2 percent of the surface. Runoff is medium, and the hazard of erosion is moderate.

This soil is used for dryland range and pasture and as a source of water. (Capability unit VIe-8 (19) dryland; Shallow Loamy range site)

Garretson Series

The Garretson series consists of well-drained soils on alluvial fans. Slopes range from 0 to 15 percent. These soils developed in alluvium made up chiefly of metasedimentary materials. Elevations range from 600 to 2,000 feet. The average annual rainfall ranges from 10 to 14 inches, the average annual temperature from 61° to 64° F., and the average frost-free season from 220 to 280 days. The vegetation is chiefly annual grasses, forbs, chamise, and sumac.

In a typical profile, the surface layer is brown and yellowish-brown, gravelly very fine sandy loam and gravelly loam about 29 inches thick. The underlying material is yellowish-brown, brown, and grayish-brown gravelly loam and loam, and it extends to a depth of more than 60 inches.

Garretson soils are near the Cortina, Arbuckle, and Perkins soils.

The Garretson soils are used for dryland grain and pasture, for irrigated citrus, truck crops, alfalfa, and grain, and for homesites.

Garretson gravelly very fine sandy loam, 2 to 8 percent slopes (GdC).—This gently to moderately sloping soil occurs on alluvial fans.

Following is a typical profile on a north-facing slope of 4 percent (750 feet south and 1,000 feet west of the north quarter corner of section 13, T. 4 S., R. 7 W.):

Ap—0 to 10 inches brown (10YR 5/3) gravelly very fine sandy loam, dark brown (10YR 3/3) when moist; weak, fine, crumb structure; slightly hard, very friable, slightly sticky and nonplastic; abundant very fine roots and few fine roots; many, very fine, irregular pores; 25 to 35 percent angular gravel; slightly acid (pH 6.2); gradual, smooth boundary. Horizon is 7 to 10 inches thick.

A1—10 to 29 inches, yellowish-brown (10YR 5/4) gravelly loam, dark yellowish brown (10YR 3/4) when moist; weak, medium, crumb structure; slightly hard, very friable, slightly sticky and nonplastic; abundant very fine roots; many, very fine, irregular pores and common, fine, tubular pores; 15 to 25 percent angular gravel; slightly acid (pH 6.5); gradual, smooth boundary. Horizon is 6 to 19 inches thick.

C1—29 to 42 inches, yellowish-brown (10YR 5/4) gravelly loam, dark yellowish brown (10YR 3/4) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; abundant very fine roots; many, very fine, tubular pores; 20 to 30 percent angular gravel and cobblestones; slightly acid (pH 6.5); gradual, smooth boundary. Horizon is 4 to 36 inches thick.

C2—42 to 53 inches, brown (10YR 5/3) gravelly loam, brown to dark brown (10YR 4/3) when moist; massive; slightly hard, very friable, slightly sticky and nonplastic; abundant very fine roots; few, very fine, tubular pores; 30 to 40 percent angular gravel and cobblestones; slightly acid (pH 6.5); gradual, smooth boundary. Horizon is 11 to 23 inches thick.

C3—53 to 72 inches, grayish-brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; common, very fine, tubular and irregular pores; 5 to 10 percent angular gravel and cobblestones; neutral (pH 6.8).

The A horizon is slightly acid to neutral in reaction, grayish brown to brown to yellowish brown in color, and gravelly loam to gravelly very fine sandy loam in texture. The C horizon is grayish brown to brown or yellowish brown in color and generally is gravelly loam to silt loam in texture. In some places the profile is very fine sandy loam throughout.

Included with this soil in mapping are small areas of Cortina gravelly coarse sandy loam, Arbuckle gravelly loam, and Perkins gravelly loam. Also included are some areas where streambank erosion and deposition have occurred.

Permeability of this soil is moderate. Runoff is slow to medium, and the hazard of erosion is slight to moderate. The available water holding capacity is 5.0 to 7.5 inches. The root zone is more than 60 inches deep. Natural fertility is high.

This Garretson soil is used for irrigated citrus, truck crops, alfalfa, pasture, and grain and for dryland pasture and grain. Some areas are used for homesites. (Capability unit IIe-1 (19) irrigated; Loamy range site)

Garretson very fine sandy loam, 0 to 2 percent slopes (GaA).—The profile of this soil is similar to that described for the Garretson series, but it is grayish brown and is essentially free of gravel throughout. Small areas having a fine sandy loam surface layer are included in areas mapped as this soil. Also included are some eroded areas and areas with a calcareous subsoil.

The available water holding capacity of this soil is 7.5 to 10.0 inches. Runoff is slow, and the hazard of erosion is slight.

This soil is used for irrigated truck crops, alfalfa, and grain, for dryland grain and pasture, and for homesites. (Capability unit I-1 (19) irrigated; Loamy range site)

Garretson very fine sandy loam, 2 to 8 percent slopes (GaC).—The profile of this soil is similar to that described for the Garretson series, but it is essentially free of gravel throughout. Included with this soil in mapping is a small area with lime below a depth of 40 inches.

The available water holding capacity is 7.5 to 10.0 inches. Runoff is slow to medium, and the hazard of erosion is slight to moderate.

This soil is used for irrigated citrus, alfalfa, truck crops, and grain, for dryland grain and pasture, and for homesites. (Capability unit IIe-1 (19) irrigated; Loamy range site)

Garretson very fine sandy loam, 8 to 15 percent slopes, eroded (GaD2).—The profile of this soil is similar to that described for the Garretson series, but it is essentially free of gravel throughout. Shallow gullies occur, and there is washing in furrows. Included with this soil in mapping are areas with a fine sandy loam surface layer. Also included are areas having a sandy loam substratum.

The available water holding capacity of this soil is 7.5 to 10.0 inches. Runoff is medium, and the hazard of erosion is moderate.

This soil is used for irrigated citrus and grain, for dry-

land grain and pasture, and for homesites. (Capability unit IIIe-1 (19) irrigated; Loamy range site)

Garretson gravelly very fine sandy loam, 0 to 2 percent slopes (GdA).—Included with this soil in mapping are small areas that have gravelly coarse sand at a depth of 30 to 40 inches. Also included are areas with a gravelly fine sandy loam surface layer.

Runoff is slow on this soil, and the hazard of erosion is slight.

This soil is used for irrigated truck crops, alfalfa, and grain, for dryland pasture and grain, and for homesites. (Capability unit IIs-4 (19) irrigated; Loamy range site)

Garretson gravelly very fine sandy loam, 8 to 15 percent slopes, eroded (GdD2).—This soil is cut by shallow gullies, and erosion occurs in furrows. Included in mapping are small areas that have loamy sand underlying material at a depth of 30 to 40 inches. Also included are areas that have slopes of 15 to 25 percent and a gravelly fine sandy loam surface layer. Some included areas consist of drainageways where erosion and deposition have occurred along the channel.

Runoff is medium on this soil, and the hazard of erosion is moderate.

This soil is used for irrigated citrus and grain, for dryland grain and pasture, and for homesites. (Capability unit IIIe-1 (19) irrigated; Loamy range site)

Gaviota Series

Soils of the Gaviota series are well drained to somewhat excessively drained. Slopes are 15 to 75 percent. These soils occur on uplands, where they developed on fine-grained sandstone. Elevations range from 600 to 1,200 feet. The average annual rainfall ranges from 10 to 15 inches, the average annual temperature from 59° to 63° F., and the average frost-free season from 250 to 300 days. The vegetation is chiefly annual grasses, alfilaria, and forbs. A few oak trees grow in the drainageways.

In a typical profile, the surface layer is brown very fine sandy loam about 15 inches thick. The parent rock is pale-brown sandstone.

The Gaviota soils are near the Altamont and Vallecitos soils.

Gaviota soils are used for range, recreation, and as a source of water.

Gaviota very fine sandy loam, 15 to 50 percent slopes, eroded (GfF2).—This hilly to steep soil occurs on uplands.

Following is a typical profile on a north-facing slope of 16 percent (900 feet south and 800 feet west of the northeast corner of section 30, T. 3 S., R. 7 W.):

A11—0 to 9 inches, brown (10YR 5/3) very fine sandy loam, dark brown (10YR 3/3) when moist; moderate, medium, granular structure; slightly hard, friable, slightly sticky and nonplastic; abundant very fine roots; many very fine pores; slightly acid (pH 6.3); gradual, smooth boundary. Horizon is 6 to 10 inches thick.

A12—9 to 15 inches, brown (10YR 5/3) very fine sandy loam, dark brown (10YR 3/3) when moist; moderate, medium, granular structure; slightly hard, friable, slightly sticky and nonplastic; abundant very fine roots; common fine and very fine pores; slightly acid (pH 6.3); abrupt, wavy boundary. Horizon is 4 to 10 inches thick.

R—15 inches, pale-brown (10 YR 6/3) and brownish-yellow (10YR 6/6) weathered sandstone; upper few inches is soft, but hardness increases with depth.

The A horizon is slightly acid to neutral in reaction and grayish brown to brown in color. In some places the A horizon is fine sandy loam. The thin weathered crust of the R layer is slightly acid to neutral in reaction and pale brown and brownish yellow in color. Depth to sandstone commonly ranges from 10 to 20 inches but may be as shallow as 6 inches in some areas. Rock crops out in some places.

Included with this soil in mapping are small areas of Altamont clay and Vallecitos loam.

This well-drained soil has moderate permeability. The available water holding capacity is 1.5 to 3.0 inches. Runoff is medium to rapid, and the hazard of erosion is high. The root zone is 10 to 20 inches deep. Natural fertility is low.

This Gaviota soil is used for range, for recreation, and as a source of water. (Capability unit VIIe-1 (19) dryland; Shallow Loamy range site)

Gaviota rocky fine sandy loam, 25 to 75 percent slopes, severely eroded (GeG3).—The profile of this soil is similar to that described for the Gaviota series, but the texture of the surface layer is fine sandy loam. Sandstone is generally at a depth of 6 to 15 inches. Exposed sandstone ledges and rock outcrops cover 2 to 10 percent of the surface. Numerous small gullies occur.

Included in mapping are a few small areas with a rocky very fine sandy loam surface layer.

This soil is somewhat excessively drained. The available water holding capacity is 0.5 to 1.0 inch. Runoff is rapid to very rapid, and the hazard of erosion is high to very high. The root zone is 6 to 15 inches deep. Natural fertility is very low.

The soil is used as a source of water. (Capability unit VIIIs-1 (19, 20) dryland; range site not assigned)

Gaviota rocky very fine sandy loam, 25 to 50 percent slopes, eroded (GgF2).—From 2 to 10 percent of the surface of this soil is covered with rock outcrops and long sandstone ledges. A few small areas of Gaviota rocky fine sandy loam are included.

Runoff is rapid on this soil, and the hazard of erosion is high.

This soil is used for range, for recreation, and as a source of water. (Capability unit VIIe-1 (19) dryland; Shallow Loamy range site)

Gorgonio Series

In the Gorgonio series are somewhat excessively drained to excessively drained soils on alluvial fans. These soils developed in alluvium consisting mainly of granitic materials. Slopes are 0 to 15 percent. Elevations range from 1,200 to 2,500 feet. The average annual rainfall ranges from 10 to 18 inches, the average annual temperature from 61° to 65° F., and the average frost-free season from 220 to 250 days. The vegetation is chiefly annual grasses, forbs, and shrubs.

In a typical profile, the surface layer is dark grayish-brown to brown gravelly loamy fine sand about 15 inches thick. The underlying material is brown, stratified gravelly loamy sand and gravelly loamy fine sand, and it extends to a depth of more than 60 inches.

The Gorgonio soils are near the Hanford, Tujunga, and Soboba soils.

Gorgonio soils are used for dryland pasture and range, for irrigated alfalfa and apricots, and for homesites.

Gorgonio gravelly loamy fine sand, 2 to 15 percent slopes (GmD).—This gently sloping to strongly sloping soil occurs on alluvial fans.

Following is a typical profile on a southeast-facing

slope of 3 percent (900 feet east and 850 feet south of the west quarter corner of section 12, T. 3 S., R. 1 E.):

A11—0 to 1 inch, dark grayish-brown (10YR 4/2) gravelly loamy fine sand, very dark grayish brown (10YR 3/2) when moist; thin, platy structure, parting to moderate, crumb structure; soft, very friable, nonsticky and nonplastic; plentiful medium and fine roots; many, fine, irregular pores; slightly acid (pH 6.5); abrupt, smooth boundary. Horizon is 1 to 3 inches thick.

A12—1 to 7 inches, brown (10YR 5/3) gravelly loamy fine sand, dark brown (10YR 3/3) when moist; weak crumb structure; soft, very friable, nonsticky and nonplastic; abundant very fine and few fine roots; many, very fine, irregular pores; medium acid (pH 6.0); gradual, smooth boundary. Horizon is 4 to 6 inches thick.

A13—7 to 15 inches, brown (10YR 5/3) gravelly loamy fine sand, dark brown (10YR 3/3) when moist; weak crumb structure; soft, very friable, nonsticky and nonplastic; abundant very fine and few fine roots; many, very fine, irregular pores; medium acid (pH 6.0); gradual, smooth boundary. Horizon is 6 to 8 inches thick.

C1—15 to 29 inches, brown (10YR 5/3) gravelly loamy fine sand, dark brown (10YR 3/3) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; few medium and fine roots; many, fine, irregular pores; medium acid (pH 6.0); diffuse, smooth boundary. Horizon is 12 to 14 inches thick.

C2—29 to 44 inches, brown (10YR 5/3) gravelly loamy sand, dark brown (10YR 3/3) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; very few fine roots; many, fine, irregular pores; medium acid (pH 6.0); diffuse, smooth boundary. Horizon is 12 to 16 inches thick.

C3—44 to 60 inches, brown (10YR 5/3), stratified gravelly loamy sand, brown to dark brown (10YR 4/3) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; many, fine, irregular pores; medium acid (pH 6.0).

The A horizon is grayish brown to very dark grayish brown to brown in color and gravelly loamy sand to gravelly loamy fine sand in texture. The C horizon is light grayish-brown to brown, stratified gravelly loamy sand to very gravelly loamy fine sand. The C3 horizon is stratified material that is gravelly, cobbly, or both.

Included with this soil in mapping are small areas of Tujunga loamy sand, Hanford coarse sandy loam, and Soboba cobbly loamy sand. Also included are some areas with a gravelly loamy sand surface layer.

This is a somewhat excessively drained soil that has rapid permeability. Runoff is slow to medium, and the hazard of erosion is slight to moderate. The available water holding capacity is 3.0 to 4.0 inches. The root zone is greater than 60 inches deep. Natural fertility is low.

This Gorgonio soil is used for dryland pasture, for irrigated alfalfa and apricots, and for homesites. (Capability unit IVs—4 (19) irrigated; Sandy range site)

Gorgonio loamy sand, 0 to 8 percent slopes (GhC).—The profile of this soil is similar to that described for the Gorgonio series, but it has a loamy sand surface layer. Included with this soil in mapping is a small area of moderately deep (20 to 36 inches) loamy sand over coarse sand.

This soil is excessively drained and has very rapid permeability. Runoff is slow, and the hazard of erosion is slight. The available water holding capacity is 3.7 to 4.5 inches.

This soil is used for dryland pasture and for nonfarm purposes. (Capability unit IIIs-4 (19) irrigated; Sandy range site)

Gorgonio loamy sand, 8 to 15 percent slopes (GhD).—The profile of this soil is similar to that described for the Gorgonio series, but it has a loamy sand surface layer. Included with this soil in mapping is a small area having slopes of 15 to 25 percent.

This soil is excessively drained and has very rapid permeability. Runoff is slow, and the hazard of erosion is slight. The available water holding capacity is 3.5 to 4.5 inches.

This soil is used for dryland pasture and for homesites. (Capability unit IVs-4 (19) irrigated; Sandy range site)

Gorgonio loamy sand, channeled, 2 to 15 percent slopes (GkD).—The profile of this soil is similar to that described for the Gorgonio series, but it is relatively free of gravel in the surface layer. Braided stream channels have been cut across areas of this soil.

Included in mapping are a few small areas that are underlain at depths of 20 to 36 inches by gravelly coarse sand. Also included are some areas where slopes are 0 to 2 percent.

Runoff is slow to rapid on this soil, and the hazard of erosion is moderate to high.

This soil is used for range, as a source of water, and for recreation. (Capability unit VIIw-4 (19) dryland; Sandy Alluvial range site)

Gorgonio loamy sand, deep, 2 to 8 percent slopes (GlC).—The profile of this soil is similar to that described for the Gorgonio series, but it has a loamy sand surface layer and is free of gravel. Sandy loam occurs at a depth of 36 to 60 inches.

Included with this soil in mapping is a small area of Gorgonio loamy sand that is 60 inches deep. Also included are small areas of Gorgonio soils that are underlain by gravelly coarse sand at depths of 36 to 60 inches. Some small included areas have slopes of 0 to 2 percent.

The available water holding capacity of this soil is 5.0 to 6.0 inches. Runoff is slow, and the hazard of erosion is slight.

This soil is used for irrigated pasture and for nonfarm purposes. (Capability unit IIs-4 (19) irrigated; Sandy range site)

Gorgonio cobbly loamy fine sand, 2 to 15 percent slopes (GnD).—The profile of this soil is similar to that described for the Gorgonio series, but it is cobbly loamy fine sand throughout.

Included with this soil in mapping are a few small areas in which the underlying material is sandy loam. Also included are Gorgonio soils that have slopes of 15 to 25 percent.

Runoff is slow on this soil, and the hazard of erosion is slight.

This soil is used for dryland pasture and range and for homesites. (Capability unit VIe-7 (19) dryland; Sandy range site)

Grangeville Series

The Grangeville series consists of moderately well drained to poorly drained soils on alluvial fans and flood plains. These soils developed in alluvium from granitic materials. Slopes are 0 to 15 percent. Elevations range from 600 to 1,800 feet. The average annual rainfall ranges from 11 to 14 inches, the average annual temperature from 61° to 64° F., and the average frost-free season from 200 to 270 days. The vegetation is chiefly annual

grasses, saltgrass, and forbs but includes some cottonwoods.

In a typical profile, the surface layer is grayish-brown loamy fine sand and loamy very fine sand about 17 inches thick. The underlying layers are stratified and range from grayish brown to light brownish gray in color and from loamy fine sand to very fine sandy loam in texture. Depth to the water table in the Grangeville soils is from 20 to more than 48 inches.

The Grangeville soils are near the Dello and Traver soils.

Grangeville soils are used for dryland grain, for irrigated alfalfa, truck crops, and pasture, and for homesites.

Grangeville loamy fine sand, drained, 0 to 5 percent slopes (GoB).—This nearly level to gently sloping soil occurs on alluvial fans and flood plains.

Following is a typical profile on an east-facing slope of 1 percent (1,680 feet north and 20 feet east of the southwest corner of section 25, T. 4 S., R. 1 W.):

Ap—0 to 10 inches, grayish-brown (2.5Y 5/2) loamy fine sand, very dark grayish brown (2.5Y 3/2) when moist; weak, fine, subangular blocky structure; soft, very friable, nonsticky and nonplastic; few, very fine, random roots; common, very fine, irregular pores; moderately alkaline (pH 8.0); slightly effervescent; abrupt, wavy boundary. Horizon is 3 to 10 inches thick.

A1—10 to 17 inches, grayish-brown (2.5Y 5/2) loamy very fine sand, very dark grayish brown (2.5Y 3/2) when moist; massive; soft, very friable, nonsticky and nonplastic; plentiful, very fine, random roots; few, very fine, irregular pores; moderately alkaline (pH 8.2); slightly effervescent; abrupt, wavy boundary. Horizon is 4 to 7 inches thick.

C1—17 to 19 inches, grayish-brown (2.5Y 5/2) very fine sandy loam, dark grayish brown (2.5Y 4/2) when moist; massive; soft, very friable, slightly sticky and slightly plastic; plentiful, very fine, random roots; few, very fine, tubular pores and common, very fine, irregular pores; moderately alkaline (pH 8.4); strongly effervescent; variable silt lenses 1 to 5 inches thick; few, fine, faint mottles; abrupt, irregular boundary. Horizon is 2 to 11 inches thick.

C2—19 to 39 inches, light brownish-gray (2.5Y 6/2) loamy very fine sand, dark grayish brown (2.5Y 4/2) when moist; massive; soft, very friable, nonsticky and nonplastic; few, very fine, random roots; few, very fine, tubular pores and many, very fine, irregular pores; moderately alkaline (pH 8.4); strongly effervescent; few, fine, faint mottles; gradual, wavy boundary. Horizon is 5 to 20 inches thick.

C3—39 to 45 inches, grayish-brown (2.5Y 5/2) loamy very fine sand, very dark grayish brown (2.5Y 3/2) when moist; massive; soft, very friable, nonsticky and nonplastic; few, very fine, tubular pores and many, very fine, irregular pores; moderately alkaline (pH 8.4); strongly effervescent; highly micaceous; gradual, irregular boundary. Horizon is 5 to 16 inches thick.

C4—45 to 60 inches, grayish-brown (2.5Y 5/2) loamy fine sand, very dark grayish brown (2.5Y 3/2) when moist; massive; soft, very friable, nonsticky and nonplastic; few, very fine, random pores; strongly alkaline (pH 8.6); strongly effervescent.

The A horizon is gray, brownish gray, light brownish gray, or grayish brown in color. The C horizon is grayish brown to light brownish gray in color and loamy sand to very fine sandy loam in texture. In places the lower C horizon is stratified with loamy sand to silty clay loam.

Included with this soil in mapping are small areas of Dello loamy fine sand and Traver fine sandy loam. Some included areas have a loamy sand or very fine sandy loam surface layer. Also included are areas of streambank erosion and deposition.

This moderately well drained soil has moderately rapid permeability. Runoff is slow, and the hazard of erosion is slight. The available water holding capacity is 5.0 to 7.5 inches. The root zone is more than 60 inches deep. Natural fertility is moderate.

This Grangeville soil is used for irrigated alfalfa, for dryland pasture and grain, and for homesites. (Capability unit IIs-4 (19) irrigated; Sandy Basin range site)

Grangeville sandy loam, drained, saline-alkali, 0 to 5 percent slopes (GpB).—The profile of this soil is similar to that described for the Grangeville series, but it is gray sandy loam throughout and is slightly to moderately saline-alkali. Included with this soil in mapping are small areas having a loamy sand surface layer. Also included are small areas of sandy loam that are 36 to 48 inches deep over coarse gravelly sand.

The available water holding capacity of this soil is 6.0 to 7.5 inches. Runoff is slow, and the hazard of erosion is slight. Natural fertility is moderately low.

This soil is used for dryland pasture and grain, for irrigated alfalfa and permanent pasture, and for homesites. (Capability unit IIIs-6 (19) irrigated; Sandy Basin range site)

Grangeville sandy loam, sandy substratum, drained, 0 to 5 percent slopes (GrB).—The profile of this soil is similar to that described for the Grangeville series, but it has a gray sandy loam surface layer and is 30 to 42 inches deep over very coarse sand. Included in mapping are small areas where the underlying material is coarse loamy sand, and small areas that have a gravelly loam surface layer.

The available water holding capacity of this soil is 3.75 to 6.5 inches. Runoff is slow, and the hazard of erosion is slight. The root zone is 30 to 42 inches thick.

This soil is used for dryland pasture and grain, for irrigated alfalfa and permanent pasture, and for homesites. (Capability unit IIIs-0 (19) irrigated; Sandy Basin range site)

Grangeville sandy loam, sandy substratum, drained, saline-alkali, 0 to 5 percent slopes (GsB).—The profile of this soil is similar to that described for the Grangeville series, but it has a surface layer of light brownish-gray sandy loam. Loamy coarse sand is at a depth of 30 to 40 inches. This soil is moderately saline-alkali.

Included with this soil in mapping are small areas having a loamy sand surface layer. These inclusions are not saline-alkali and have a water table at a depth of 36 to 60 inches.

The available water holding capacity of this soil is 4.5 to 6.0 inches. Runoff is slow, and the hazard of erosion is slight. The root zone is 30 to 40 inches deep. Natural fertility is low.

This soil is used for dryland grain and pasture, for irrigated alfalfa, and for homesites. (Capability unit IIIs-6 (19) irrigated; Sandy Basin range site)

Grangeville fine sandy loam, drained, 0 to 2 percent slopes (GtA).—The profile of this soil is similar to that described for the Grangeville series, but it has a fine sandy loam surface layer. Loam is at a depth of 36 to 54 inches.

Included with this soil in mapping are some small eroded areas and areas having slopes of 2 to 5 percent. Also included are areas that have a water table at a

depth of 36 to 48 inches. Some included areas have loamy sand underlying material.

This soil has been drained. Its permeability is moderate. The available water holding capacity is 7.5 to 10.0 inches. Runoff is slow, and the hazard of erosion is slight.

This soil is used for dryland grain and pasture, for irrigated alfalfa and truck crops, and for homesites. (Capability unit I-1 (19) irrigated; Sandy Basin range site)

Grangeville fine sandy loam, drained, 5 to 15 percent slopes (GtD).—The profile of this soil is similar to that described for the Grangeville series, but it is gray fine sandy loam throughout. Included in mapping is a small area having a gravelly fine sandy loam surface layer. Also included are small areas with a sandy loam or loamy sand substratum at a depth of 30 to 40 inches. A few small areas are included where slopes are 15 to 25 percent.

The available water holding capacity of this soil is 7.7 to 10.0 inches. Runoff is medium, and the hazard of erosion is moderate.

This soil is used for dryland pasture and grain and for homesites. (Capability unit IIIe-6 (19) irrigated; Sandy Basin range site)

Grangeville fine sandy loam, poorly drained, saline-alkali, 0 to 5 percent slopes (GuB).—The profile of this soil is similar to that described for the Grangeville series, but it has a light grayish-brown fine sandy loam surface layer. The water table is at a depth of 20 to 36 inches. This soil is moderately to strongly saline-alkali.

Included with this soil in mapping are a few areas of eroded soil. Also included are some areas with coarse gravelly sand at a depth of 26 to 42 inches.

The available water holding capacity of this soil is 5.0 to 9.0 inches. Runoff is slow, and the hazard of erosion is slight. Drainage is poor. Natural fertility is low.

This soil is used for dryland pasture and range. (Capability unit IVw-6 (19) irrigated; Sandy Basin range site)

Grangeville fine sandy loam, saline-alkali, 0 to 5 percent slopes (GvB).—The profile of this soil is similar to that described for the Grangeville series, but it has a light brownish-gray fine sandy loam surface layer and is underlain by loam at a depth of 26 to 40 inches. This soil is moderately to strongly saline-alkali. Approximately one-tenth of the acreage is strongly saline-alkali. Generally, the water table is at a depth of 36 to 60 inches.

Included with this soil in mapping are areas of fine sandy loam that are 26 to 48 inches deep over coarse gravelly sand.

The available water holding capacity of this soil is 7.0 to 9.5 inches. Runoff is slow, and the hazard of erosion is slight. Drainage is somewhat poor. Natural fertility is low.

This soil is used for dryland pasture and grain and for homesites. (Capability unit IIIw-6 (19) irrigated; Sandy Basin range site)

Grangeville fine sandy loam, loamy substratum, drained, 0 to 2 percent slopes (GwA).—The profile of this soil is similar to that described for the Grangeville series, but it has a light brownish-gray fine sandy loam surface layer and overlies loam at a depth of 36 inches. Included with this soil in mapping are small areas having a very fine sandy loam or loamy sand surface layer. Also included are some areas of deep fine sandy loam over gravelly loamy sand.

The available water holding capacity of this soil is 7.5 to 9.0 inches. Runoff is slow, and the hazard of erosion is slight.

This soil is used for dryland grain and pasture, for irrigated alfalfa and truck crops, and for homesites. (Capability unit I-1 (19) irrigated; Sandy Basin range site)

Grangeville fine sandy loam, loamy substratum, drained, saline-alkali, 0 to 2 percent slopes (GxA).—The profile of this soil is similar to that described for the Grangeville series, but it has a light brownish-gray fine sandy loam surface layer and is 26 to 40 inches deep over loam. This soil is moderately to strongly saline-alkali.

Included with this soil in mapping are areas having a loamy sand or very fine sandy loam surface layer. Also included are some areas in which fine sandy loam is 24 to 40 inches deep over coarse sand. Some included areas have slopes of 2 to 5 percent.

The available water holding capacity of this soil is 7.0 to 10.0 inches. Runoff is slow, and the hazard of erosion is slight. Natural fertility is low.

This soil is used for irrigated alfalfa and permanent pasture, for dryland grain and pasture, and for homesites. (Capability unit IIIs-6 (19) irrigated; Sandy Basin range site)

Greenfield Series

Soils of the Greenfield series are on alluvial fans and terraces. Slopes are 0 to 25 percent. These well-drained soils developed in alluvium consisting mainly of granitic materials. Elevations range from 600 to 3,500 feet. The average annual rainfall ranges from 10 to 18 inches, the average annual temperature from 59° to 64° F., and the average frost-free season from 200 to 280 days. The vegetation is chiefly annual grasses, forbs, sumac, and chamise but includes some scattered oak trees.

In a typical profile, the surface layer is brown sandy loam about 26 inches thick. The subsoil is brown sandy loam and pale-brown loam and extends to a depth of about 60 inches.

The Greenfield soils are near the Hanford, Pachappa, Arlington, and Ramona soils.

Greenfield soils are used for dryland grain and pasture, for irrigated truck crops, alfalfa, potatoes, citrus, and peaches, and for homesites.

Greenfield sandy loam, 2 to 8 percent slopes, eroded (GyC2).—This gently to moderately sloping soil occurs on alluvial fans and terraces.

Following is a typical profile on a southeast-facing slope of 6 percent (1,250 feet north and 380 feet west of the south quarter corner of section 18, T. 3 S., R. 2 W.):

Ap—0 to 14 inches, brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) when moist; weak, medium, angular blocky and weak, fine, granular structure; slightly hard, very friable, slightly sticky and slightly plastic; abundant fine and very fine roots; common fine and very fine pores; slightly acid (pH 6.5); gradual, smooth boundary. Horizon is 5 to 14 inches thick.

A1—14 to 26 inches, brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, medium, angular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic;

abundant very fine roots; many very fine and few fine pores; neutral (pH 7.0); gradual, wavy boundary. Horizon is 4 to 16 inches thick.

B1—26 to 43 inches, brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) when moist; moderate, medium, angular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; abundant very fine roots; many very fine and few fine pores; colloidal stains and few bridges; neutral (pH 7.0). Horizon is 8 to 20 inches thick.

B2t—43 to 60 inches, pale-brown (10YR 6/3) loam, dark brown (10YR 3/3) when moist; moderate, coarse, angular blocky structure; hard, friable, sticky and plastic; few very fine roots; common fine and many very fine pores; mildly alkaline (pH 7.4); few thin clay films in pores and bridges.

The A horizon is light brownish gray to dark grayish brown to brown in color and sandy loam to very fine sandy loam in texture. The B horizon is slightly acid to mildly alkaline sandy loam to loam. The C horizon, where present, is stratified reddish-brown to brown very fine sandy loam to loamy sand alluvium.

Included with this soil in mapping are small areas of Hanford coarse sandy loam, Pachappa fine sandy loam, Arlington fine sandy loam, and Ramona sandy loam. Some small areas having a loamy fine sand or gravelly sandy loam surface layer are included. Also, some soils that are slightly wet are included.

Permeability of this soil is moderate. Runoff is slow to medium, and the hazard of erosion is slight to moderate. The available water holding capacity is 7.5 to 10.0 inches. The root zone is more than 60 inches deep. Natural fertility is high.

This soil is used for dryland grain and pasture, for irrigated alfalfa, potatoes, citrus, and peaches, and for homesites. (Capability unit IIe-1 (19) irrigated; Loamy range site)

Greenfield sandy loam, 0 to 2 percent slopes (GyA).—Except for its uneroded surface layer, this soil has a profile that is similar to the one described for the series. Included in mapping are areas that have a fine sandy loam surface layer and make up about one-tenth of the total acreage. Also included are areas that are underlain by loamy fine sand or loamy sand; some eroded spots; and an area that is slightly wet.

Runoff is slow on this soil, and the hazard of erosion is slight.

This soil is used for irrigated citrus fruits, peaches, truck crops, and alfalfa, for dryland grain and pasture, and for homesites. (Capability unit I-1 (19) irrigated; Loamy range site)

Greenfield sandy loam, 8 to 15 percent slopes, eroded (GyD2).—The profile of this soil is similar to that described for the Greenfield series, but it has a dark grayish-brown surface layer. Included with this soil in mapping are a few small areas that have a gravelly sandy loam surface layer.

Runoff is medium on this soil, and the hazard of erosion is moderate.

This soil is used for dryland grain and pasture, for irrigated citrus, peaches, and truck crops, and for homesites. (Capability unit IIIe-1 (19) irrigated; Loamy range site)

Greenfield sandy loam, 15 to 25 percent slopes, eroded, (GyE2).—Included with this soil in mapping are small areas having a gravelly sandy loam or very fine sandy loam surface layer. Also included is an area underlain at a depth of 24 to 42 inches by gray calcareous sediments (San Timoteo formation) in the San Timoteo Badlands in the north-central part of the survey area.

Runoff is rapid on this soil, and the hazard of erosion is high. The available water holding capacity is 6.5 to 8.5 inches.

This soil is used for dryland grain and pasture, for irrigated peaches and citrus, and for homesites. (Capability unit IVe-1 (19) irrigated; Loamy range site)

Gullied land (GzG) consists of acid igneous alluvium on older fans and terraces. This alluvial material has been severely eroded and dissected by drainageways. The original landform has been destroyed, and only remnants remain. Slopes range from 25 to 75 percent.

This land is made up chiefly of material from granite, granodiorite, gneiss, and mica-schist. It is slightly acid to moderately alkaline and is intermittently effervescent. It ranges in color from pale brown through grayish brown to dark brown.

Vegetation consists of a very sparse stand of annual grasses and scattered forbs. These plants produce no harvestable forage. Where this land is near areas of cropland, it provides a habitat for small game, such as rabbits, doves, and quail. This land is also used as a source of water. (Capability unit VIIIe-1 (19, 20) dryland; range site not assigned)

Hanford Series

The Hanford series consists of well-drained and somewhat excessively drained soils on alluvial fans. Slopes are 0 to 15 percent. These soils developed in alluvium made up of granitic materials. Elevations range from 700 to 2,500 feet. The average annual rainfall ranges from 9 to 14 inches, the average annual temperature from 59° to 64° F., and the average frost-free season from 210 to 280 days. Vegetation is chiefly annual grasses, forbs, and chamise.

Typically, the upper 18 inches of the profile is grayish-brown coarse sandy loam. Underlying this is brown, stratified coarse sandy loam and loamy sand.

Hanford soils are near the Tujunga, Greenfield, and Ramona soils.

The Hanford soils are used for dryland pasture and grain and for irrigated alfalfa, potatoes, citrus, grapes, and grain. They are also used for homesites.

Hanford coarse sandy loam, 2 to 8 percent slopes (HcC).—This gently to moderately sloping soil occurs on alluvial fans.

Following is a typical profile on a northeast-facing slope of 5 percent (275 feet east and 650 feet south of the north quarter corner of section 30, T. 3 S., R. 3 W.):

Ap—0 to 8 inches, grayish-brown (10YR 5/2) coarse sandy loam, very dark grayish brown (10YR 3/2) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; abundant very fine roots; few, very fine, irregular pores; slightly acid (pH 6.2); gradual, smooth boundary. Horizon is 3 to 12 inches thick.

C1—8 to 18 inches, very similar to the Ap horizon, except slightly darker in color. Horizon is 6 to 23 inches thick.

C2—18 to 40 inches, brown (10YR 5/3) coarse sandy loam, dark brown (10YR 3/3) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; plentiful very fine roots; common, very fine, irregular pores and few, very fine, tubular pores; slightly acid (pH 6.5); clear, smooth boundary. Horizon is 4 to 28 inches thick.

C3—40 to 60 inches, brown (10YR 5/3) loamy sand, dark

brown (10YR 3/3) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; few very fine roots; slightly acid (pH 6.5).

The A horizon is neutral to slightly acid in reaction and pale brown to dark grayish brown in color. The C1 horizon is generally slightly acid to neutral coarse sandy loam to sandy loam. The C2 and C3 horizons are slightly acid to mildly alkaline, light yellowish-brown to brown, stratified loamy sand and coarse sandy loam.

Included with this soil in mapping are small areas of Tujunga loamy sand, Greenfield sandy loam, and Ramona sandy loam. Some included areas have a gravelly coarse sandy loam or fine sandy loam surface layer. Also included are some small areas of braided stream channels.

This soil is well drained. Its permeability is moderately rapid. Runoff is slow to medium, and the hazard of erosion is slight to moderate. The available water holding capacity is 5.0 to 7.5 inches. The root zone is more than 60 inches deep. Natural fertility is moderate.

This Hanford soil is used for irrigated alfalfa, potatoes, and citrus, for dryland grain and pasture, and for homesites. (Capability unit IIe-1 (19) irrigated, IVec-1 (20) dryland; Sandy range site)

Hanford loamy fine sand, 0 to 8 percent slopes (HaC).—The profile of this soil is similar to that described for the Hanford series, but it has a loamy fine sand surface layer. Areas having stratified sand and loam underlying material are included in areas mapped as this soil. Also included are a few small areas that have slopes of 8 to 15 percent.

This soil is used for irrigated alfalfa, truck crops, and citrus, for dryland grain and pasture, and for homesites. (Capability unit IIs-4 (19) irrigated, IVsc-4 (20) dryland; Sandy range site)

Hanford coarse sandy loam, 0 to 2 percent slopes (HcA).—The profile of this soil is similar to that described for the Hanford series, but it is underlain by loamy sand at a depth of 24 to 40 inches.

Included with this soil in mapping are small areas that are 24 to 48 inches deep over gravelly coarse sand. Also included are small areas that have a fine sandy loam surface layer. Some included areas consist of eroded stream channels.

The available water holding capacity of this soil is 5.0 to 6.5 inches. Runoff is slow, and the hazard of erosion is slight. Drainage is somewhat excessive. Natural fertility is moderate.

This soil is used for irrigated alfalfa and truck crops, for dryland grain and pasture, and for homesites. (Capability unit IIs-4 (19) irrigated; Sandy range site)

Hanford coarse sandy loam, 8 to 15 percent slopes, eroded (HcD2).—Rills, shallow gullies, and areas of deposition occur on this soil. Included in mapping are several areas with a gravelly sandy loam surface layer. Also included are a few small areas having slopes of 15 to 25 percent and small areas of stream channel erosion.

This soil is somewhat excessively drained. Runoff is medium, and the hazard of erosion is moderate.

This soil is used for irrigated citrus, truck crops, and grapes, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IIIe-1 (19) irrigated; IVec-1 (20) dryland; Sandy range site)

Hanford cobbly coarse sandy loam, 2 to 15 percent slopes, eroded (HdD2).—The profile of this soil is similar to that described for the Hanford series, but it has a cobbly coarse sandy loam surface layer and coarse-textured underlying material. This soil is braided with shallow stream channels.

A few small areas that have a cobbly fine sandy loam or cobbly sandy loam surface layer are included.

Drainage is somewhat excessive on this soil. The available water holding capacity is 3.0 to 4.5 inches. Runoff is slow to medium, and the hazard of erosion is slight to moderate.

This soil is used for pasture and range and for nonfarm purposes. (Capability unit VIe-7 (19, 20) dryland; Sandy range site)

Hanford coarse sandy loam, deep, 2 to 8 percent slopes, eroded (HeC2).—The profile of this soil is similar to that described for the Hanford series, but it is underlain by gravelly coarse sand at a depth of 30 to 40 inches. Rills, shallow gullies, and small areas of deposition occur.

Included with this soil in mapping are a few small areas that have a gravelly loamy sand surface layer.

This soil is somewhat excessively drained. It has rapid permeability. The available water holding capacity is 3.75 to 5.0 inches. Runoff is slow to medium, and the hazard of erosion is slight to moderate. The root zone is 30 to 40 inches deep. Natural fertility is low.

This soil is used for irrigated alfalfa, truck crops, and some citrus, for dryland grain and pasture, and for homesites. (Capability unit IIIs-0 (19) irrigated; Sandy range site)

Hanford sandy loam, 2 to 15 percent slopes (HfD).—The profile of this soil is similar to that described for the Hanford series, but it has a sandy loam surface layer. This soil is subject to stream channel erosion and deposition, and it is generally laced with braided stream channels and some entrenched channels.

Several areas that have a gravelly coarse sandy loam or a fine sandy loam surface layer are included in areas mapped as this soil. Some small areas having slopes of 15 to 25 percent are also included.

Runoff is rapid, and the hazard of erosion is high. The available water holding capacity is 5.0 to 7.5 inches.

This soil is used for dryland grain, pasture, and range and for recreation. (Capability unit VIIw-4 (19) dryland; Sandy Alluvial range site)

Hanford fine sandy loam, 0 to 2 percent slopes (HgA).—The profile of this soil is similar to that described for the Hanford series, but it has a fine sandy loam surface layer. Included with this soil in mapping are small areas with a stratified underlying material of sand and loam. A few small eroded areas are also included.

Runoff is slow on this soil, and the hazard of erosion is slight. The available water holding capacity is 7.5 to 9.5 inches.

This soil is used for irrigated alfalfa and truck crops, for dryland grain and pasture, and for homesites. (Capability unit I-1 (19) irrigated; Loamy range site)

Hilmar Series

The Hilmar series consists of moderately well drained soils on alluvial fans. Slopes range from 0 to 8 percent. These soils developed in alluvium that was washed from soils formed in granitic material and reworked by wind. Elevations range from 600 to 1,000 feet. The average annual rainfall ranges from 11 to 13 inches, the average annual temperature from 61° to 65° F., and the average

frost-free season from 250 to 310 days. The vegetation is chiefly annual grasses and forbs.

In a typical profile, the surface layer is grayish-brown and light brownish-gray loamy sand about 16 inches thick. The underlying material is light gray and light brownish gray in color and sandy loam to clay loam in texture.

The Hilmar soils are near the Tujunga, Delhi, and Chino soils.

The Hilmar soils are used for irrigated pasture, grain, truck crops, alfalfa, and grapes. They are also used for dryland grain and pasture and for homesites.

Hilmar loamy sand, 0 to 2 percent slopes, eroded (HhA2).—This soil occurs on alluvial fans.

Following is a typical profile on a south-facing slope of 2 percent (750 feet north and 50 feet east of the west quarter corner of section 19, T. 2 S., R. 6 W.):

Ap—0 to 7 inches, grayish-brown (2.5Y 5/2) loamy sand, dark grayish brown (2.5Y 4/2) when moist; single grain; loose when dry or moist, nonsticky and nonplastic when wet; moderately alkaline (pH 8.0); slightly effervescent; abrupt, smooth boundary. Horizon is 7 to 8 inches thick.

A1—7 to 16 inches, light brownish-gray (2.5Y 6/2) loamy sand, dark grayish brown (2.5Y 4/2) when moist; massive; slightly hard, friable, nonsticky and nonplastic; moderately alkaline (pH 8.0); slightly effervescent; clear, smooth boundary. Horizon is 6 to 9 inches thick.

IIC1—16 to 22 inches, light brownish-gray (2.5Y 6/2) sandy loam, olive brown (2.5Y 4/4) when moist; massive; slightly hard, friable, nonsticky and nonplastic; few medium and coarse roots; moderately alkaline (pH 8.0); slightly effervescent; few soft lime concretions; clear, smooth boundary. Horizon is 6 to 12 inches thick.

IIC2—22 to 32 inches, light-gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) when moist; massive; hard, firm, nonsticky and plastic; few medium and fine roots; few, medium, tubular pores; moderately alkaline (pH 8.0); violently effervescent; few soft lime concretions; clear, smooth boundary. Horizon is 10 to 26 inches thick.

IIC3ca—32 to 72 inches, light-gray (2.5Y 7/2) clay loam, grayish brown (2.5Y 5/2) when moist; massive; hard, firm, slightly sticky and plastic; few medium, tubular pores; moderately alkaline (pH 8.2); violently effervescent; lime in fine threads.

The A horizon is sand to loamy sand in texture. A IIC horizon of unconforming calcareous sediments is at depths of 13 to 17 inches. The IIC horizon is generally slightly to violently effervescent. It is light brownish gray to light gray in color and sandy loam to clay loam in texture.

Included with this soil in mapping are small areas of Tujunga loamy sand, Delhi fine sand, and Chino silt loam. Also included are some small areas having slopes of 2 to 8 percent.

The permeability of this soil is moderately slow, and the available water holding capacity is 6.5 to 7.5 inches. Runoff is very slow to slow. The hazard of water erosion is slight. Soil blowing is a moderate hazard. The root zone is more than 60 inches thick, and natural fertility is low to moderate.

This soil is used for irrigated alfalfa, permanent pasture, and truck crops and for dryland pasture. It is also used for homesites. (Capability until IIe-4 (19) irrigated; Sandy range site)

Hilmar loamy very fine sand, 0 to 2 percent slopes (HlA).—The profile of this soil is similar to that described for the Hilmar series, but it is light brownish-gray loamy very fine sand throughout the profile and is slightly saline-alkali.

Included with this soil in mapping are a few small areas that are not saline-alkali.

The natural fertility of this soil is moderate, and its available water holding capacity is 5.0 to 6.5 inches. Runoff is slow, and the hazard of water erosion is slight. Soil blowing is a moderate hazard. Permeability is rapid.

This soil is used for irrigated truck crops, grapes, alfalfa, and permanent pasture and for dryland pasture. It is also used for homesites. (Capability unit IIe-4 (19) irrigated; Sandy range site)

Hilmar loamy very fine sand, 2 to 8 percent slopes (HlC).—This soil has a profile similar to that described for the Hilmar series, but it is loamy very fine sand throughout the profile. Included with this soil in mapping are eroded areas having slopes of 8 to 15 percent.

The natural fertility of this soil is moderate, and its available water holding capacity is 5.0 to 6.5 inches. Runoff is slow, and the hazard of water erosion is slight. Soil blowing is a moderate hazard. Permeability is rapid.

This soil is used for irrigated truck crops, alfalfa, and pasture and for dryland grain and pasture. It is suited to homesites. (Capability unit IIIe-1 (19) irrigated; Sandy range site)

Honcut Series

In the Honcut series are well-drained soils on alluvial fans. These soils developed in alluvium from dominantly basic igneous rocks. Slopes range from 2 to 25 percent. Elevations range from 900 to 3,500 feet. The average annual rainfall ranges from 12 to 16 inches, the average annual temperature from 59° to 65° F., and the average frost-free season from 200 to 250 days. Vegetation is chiefly annual grasses, forbs, and chamise. Also, there are a few scattered oak trees.

In a typical profile, the surface layer is dark-brown sandy loam about 22 inches thick. The underlying material is brown fine sandy loam or sandy loam and extends to a depth greater than 60 inches.

The Honcut soils are near the Buren and Wyman soils.

Honcut soils are used for dryland pasture and grain and for irrigated citrus and truck crops.

Honcut sandy loam, 2 to 8 percent slopes (HnC).—This gently to moderately sloping soil occurs on alluvial fans.

Following is a typical profile on a north-facing slope of 4 percent (650 feet south and 120 feet east of the west quarter corner of section 16, T. 6 S., R. 3 W.):

Ap—0 to 10 inches, dark-brown (10YR 3/3) sandy loam, very dark brown (10YR 2/3) when moist; weak, coarse, subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; plentiful very fine and fine roots; few, fine, tubular and many, very fine and fine, irregular pores; slightly acid (pH 6.1); gradual, smooth boundary. Horizon is 6 to 12 inches thick.

A1—10 to 22 inches, dark-brown (10YR 4/3) sandy loam, very dark brown (10YR 2/2) when moist; weak, medium and coarse, subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; plentiful very fine and fine roots; few, fine, tubular and many, very fine and fine, irregular pores; slightly acid (pH 6.5); clear, smooth boundary. Horizon is 9 to 20 inches thick.

C1—22 to 44 inches, brown (7.5YR 4/4) fine sandy loam, dark brown (7.5YR 3/2) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; plentiful fine and very fine roots; many, very fine, irregular pores; slightly acid (pH

6.5); clear, wavy boundary. Horizon is 16 to 24 inches thick.

C2—44 to 60 inches, brown (7.5YR 4/4) sandy loam, dark brown (7.5YR 3/2) when moist; massive; soft, very friable, nonsticky and nonplastic; few roots; many, very fine, irregular pores; slightly acid (pH 6.5).

The A horizon is slightly acid to neutral in reaction, grayish brown, brown, or dark brown in color, and gravelly sandy loam to fine sandy loam in texture. The C horizon is grayish brown, brown, or dark brown and is sandy loam to very fine sandy loam.

Included with this soil in mapping are small areas of Buren loam and Wyman loam. A few small included areas have slopes of 0 to 2 percent.

This Honcut soil has moderately rapid permeability. Runoff is slow to medium, and the hazard of erosion is slight to moderate. The available water holding capacity is 5.5 to 7.5 inches. The root zone is more than 60 inches deep. Natural fertility is moderate.

This soil is used for irrigated citrus and dryland grain. (Capability unit IIe-1 (19) irrigated; Loamy range site)

Honcut sandy loam, 8 to 15 percent slopes, eroded (HnD2).—Small areas of deposition occur in drainageways where the slope of this soil decreases. Rills have been formed in grainfields. A few small areas with a gravelly sandy loam surface layer are included with this soil in mapping.

Runoff is medium, and the hazard of erosion is moderate.

This soil is used for irrigated citrus and for dryland grain and pasture. (Capability unit IIIe-1 (19) irrigated; Loamy range site)

Honcut loam, 2 to 8 percent slopes, eroded (HuC2).—The profile of this soil is similar to that described for the Honcut series, but it is grayish-brown light loam throughout the profile. Rills, shallow gullies, and small areas of deposition occur.

A few areas with a gravelly very fine sandy loam surface layer are included in areas mapped as this soil. Also included are areas with a sandy loam or loamy sand substratum and areas with a calcareous substratum. Some inclusions have slopes of 0 to 2 percent, and there are included small areas of stream channel erosion.

The available water holding capacity of this soil is 7.5 to 10.0 inches. Permeability is moderate. Runoff is slow to medium, and the hazard of erosion is slight to moderate. Natural fertility is high.

This soil is used for irrigated citrus and truck crops and for dryland grain and pasture. (Capability unit IIe-1 (19) irrigated; Loamy range site)

Honcut cobbly sandy loam, 2 to 25 percent slopes (HoE).—The profile of this soil is similar to that described for the Honcut series, but it has a cobbly sandy loam surface layer. This soil is subject to stream channel erosion and deposition.

Included in mapping are some areas that have no stream channel erosion. A few areas with a gravelly or cobbly loamy sand surface layer are also included.

The available water holding capacity of this soil is 3.0 to 4.5 inches. Runoff is slow to medium, and the hazard of erosion is slight to moderate. Natural fertility is low.

This soil is used for range and for nonfarm purposes. (Capability unit VIIw-4 (19) irrigated; Sandy Alluvial range site)

Las Posas Series

Soils of the Las Posas series are on uplands. Slopes range from 2 to 50 percent. These well-drained soils developed on gabbro and other intrusive basic igneous rocks. Elevations range from 1,000 to 3,000 feet. The average annual rainfall ranges from 9 to 14 inches, the average annual temperature from 59° to 65° F., and the average frost-free season from 240 to 300 days. Vegetation is chiefly annual grasses, forbs, chamise, flat-top buckwheat, and black sage.

Typically, the surface layer is reddish-brown loam and clay loam about 12 inches thick. The subsoil is dark-red clay and red heavy clay loam. At a depth of about 32 inches is yellowish-red weathered gabbro.

The Las Posas soils are near the Temescal, Cajalco, and Murrieta soils.

Las Posas soils are used for dryland pasture and grain and for irrigated citrus and truck crops.

Las Posas loam, 8 to 15 percent slopes, eroded (LaD2).—This rolling soil occurs on uplands.

Following is a typical profile on a north-facing slope of 8 percent (500 feet east and 1,000 feet north of the west quarter corner of section 18, T. 7 S., R. 1 W.):

Ap—0 to 7 inches, reddish-brown (5YR 4/4) loam, dark reddish brown (5YR 3/4) when moist; weak, medium, granular structure; hard, friable, slightly sticky and slightly plastic; abundant very fine roots; many, very fine, irregular pores; slightly acid (pH 6.2); clear, smooth boundary. Horizon is 2 to 6 inches thick.

A3—7 to 12 inches, reddish-brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) when moist; moderate, medium, angular blocky structure; hard, firm, sticky and plastic; abundant very fine roots; common, very fine, tubular pores; slightly acid (pH 6.2); clear, wavy boundary. Horizon is 4 to 8 inches thick.

B21t—12 to 17 inches, dark-red (2.5YR 3/6) clay, dark red (2.5YR 3/6) when moist; strong, coarse, angular blocky structure; very hard, very firm, very sticky and very plastic; plentiful, very fine, exped roots; common, very fine, tubular pores; continuous thick clay films on ped faces and in pores; neutral (pH 7.0); gradual, smooth boundary. Horizon is 4 to 8 inches thick.

B22t—17 to 27 inches, dark-red (2.5YR 3/6) clay, dark red (2.5YR 3/6) when moist; strong, medium, angular blocky structure; very hard, very firm, very sticky and very plastic; plentiful very fine roots (mostly in cracks along ped faces); few, very fine, tubular pores; continuous thick clay films on ped faces and in pores; neutral (pH 7.3); clear, wavy boundary. Horizon is 4 to 8 inches thick.

B3t—27 to 32 inches, red (2.5YR 4/6) heavy clay loam, dark red (2.5YR 3/6) when moist; strong, medium, angular blocky structure; very hard, firm, sticky and plastic; few very fine roots; few, very fine, tubular pores; many moderately thick clay films on ped faces and in pores; neutral (pH 7.3); clear, wavy boundary. Horizon is 6 to 12 inches thick.

C1—32 to 40 inches, yellowish-red (5YR 5/6) weathered fine-grained gabbro, yellowish red (5YR 4/6) when moist; neutral (pH 7.3); clear, smooth boundary. Horizon is 8 to 10 inches thick.

C2—40 to 54 inches, pale-brown (10YR 6/3) weathered gabbro; neutral (pH 7.0).

The A horizon is slightly acid to neutral in reaction and reddish brown to brown or dark brown in color. The Bt horizon is generally neutral to mildly alkaline in reaction, dark red to red in color, and heavy clay loam to clay in

texture. The C horizon is yellowish-red to pale-brown weathered gabbro. Depth to the decomposing gabbro ranges from 20 to 42 inches.

Included with this soil in mapping are small areas of Cajalco fine sandy loam, Temescal loam, and Murrieta stony clay loam. Also included are small areas with a gravelly loam surface layer.

This soil has moderately slow permeability. Its available water holding capacity is 3.75 to 7.0 inches. Runoff is medium, and the hazard of erosion is moderate. The root zone is 20 to 42 inches thick. Natural fertility is moderate.

This Las Posas soil is used for dryland grain and pasture and for irrigated citrus. (Capability unit IVe–1 (19) irrigated; Loamy range site)

Las Posas loam, 2 to 8 percent slopes (LaC).—A few small areas that are 45 to 60 inches deep to weathered gabbro are included with this soil in mapping.

Runoff is slow to medium on this soil, and the hazard of erosion is slight to moderate. The root zone is generally 20 to 45 inches thick.

This soil is used for irrigated citrus and truck crops and for dryland grain and pasture. (Capability unit IIIe–1 (19) irrigated; Loamy range site)

Las Posas loam, 5 to 8 percent slopes, eroded (LaC2).—The profile of this soil is similar to that described for the Las Posas series, but it is 18 to 30 inches deep to weathered gabbro.

The available water holding capacity is 3.0 to 5.0 inches. Runoff is rapid, and the hazard of erosion is high. The root zone is 18 to 30 inches thick. Natural fertility is low.

This soil is used for irrigated citrus and truck crops and for dryland grain and pasture. (Capability unit IVe–1 (19) irrigated; Loamy range site)

Las Posas loam, 8 to 25 percent slopes, severely eroded (LaE3).—The profile of this soil is similar to that described for the Las Posas series, but it is 10 to 20 inches deep to weathered gabbro.

A few small areas with a gravelly loam surface layer are included with this soil in mapping.

The available water holding capacity of this soil is 2.0 to 3.0 inches. Runoff is rapid, and the hazard of erosion is high. The root zone is 10 to 20 inches thick. Natural fertility is low.

This soil is used for dryland pasture and for irrigated citrus. It is also used for truck crops where it occurs in a field made up largely of more suitable soils. (Capability unit VIe–1 (19) dryland; Shallow Loamy range site)

Las Posas stony loam, 8 to 15 percent slopes, eroded (LcD2).—The profile of this soil is similar to that described for the Las Posas series, but it has a stony surface layer and is 10 to 36 inches deep.

A few small areas of rock outcrops are included with this soil in mapping.

The available water holding capacity of this soil is 2.0 to 5.0 inches. Runoff is medium, and the hazard of erosion is moderate.

This soil is used for dryland pasture and, where included in fields of more suitable soil, for irrigated citrus. (Capability unit VIe–7 (19) dryland; Loamy range site)

Las Posas rocky loam, 8 to 15 percent slopes, eroded (LkD2).—The profile of this soil is similar to that described for the Las Posas series, but it is 20 to 26 inches deep to weathered gabbro and has a yellowish-brown subsoil. Rock outcrops occupy 2 to 10 percent of the surface.

A few small areas that have a fine sandy loam surface layer and rock outcrops are included with this soil in mapping. Also included are some areas having a stony loam surface layer.

The available water holding capacity of this soil is 3.0 to 4.0 inches. Runoff is rapid, and the hazard of erosion is high. The root zone is 20 to 26 inches deep. Natural fertility is low.

This soil is used for range and dryland pasture. (Capability unit VIe–7 (19) dryland; Loamy range site)

Las Posas rocky loam, 15 to 50 percent slopes, severely eroded (LkF3).—The profile of this soil is similar to that described for the Las Posas series, but it is 15 to 20 inches deep to weathered gabbro and has a yellowish-red subsoil. Rock outcrops are on 2 to 10 percent of the surface.

A few small areas with a fine sandy loam or stony loam surface layer and rock outcrops are included with this soil in mapping.

The available water holding capacity of this soil is 2.0 to 3.0 inches. Runoff is rapid, and the hazard of erosion is high. The root zone is 15 to 20 inches deep. Natural fertility is low.

This soil is used for range. (Capability unit VIIe–1 (19) dryland; Shallow Loamy range stie)

Lodo Series

The Lodo series consists of somewhat excessively drained upland soils on slopes of 8 to 50 percent. These soils developed on metamorphosed fine-grained sandstone. Elevations range from 700 to 2,500 feet. The average annual rainfall ranges from 10 to 14 inches, the average annual temperature from 62° to 65° F., and the average frost-free season from 230 to 250 days. Vegetation is chiefly annual grasses, forbs, and chaparral.

In a typical profile, the surface layer is brown gravelly loam about 8 inches thick. Underlying this is brown shattered and weathered fine-grained metamorphosed sandstone. Depth to the sandstone varies from 8 to 15 inches.

Lodo soils are near the Vallecitos, Escondido, Temescal, and Cajalco soils.

The Lodo soils are used for range and dryland pasture.

Lodo rocky loam, 8 to 25 percent slopes, eroded (LpE2).—This rolling to hilly soil occurs on uplands. Rock outcrops occupy 2 to 10 percent of the surface.

Following is a typical profile on an east-facing slope of 14 percent (150 feet east of the west quarter corner of section 27, T. 5 S., R. 4 W.):

A11—0 to 3 inches, brown (10YR 5/3–4/3) gravelly loam, dark brown (10YR 3/3) when moist; moderate, medium, angular blocky structure; slightly hard, friable, nonsticky and slightly plastic; abundant fine and very fine roots; many, fine and very fine tubular pores; slightly acid (pH 6.4); clear, smooth boundary. Horizon is 3 to 6 inches thick.

A12—3 to 8 inches, brown (7.5YR 5/4) gravelly loam, dark yellowish brown (10YR 3/4) when moist; moderate, medium, angular blocky structure; hard, friable, nonsticky and slightly plastic; abundant very fine roots; many very fine pores; slightly acid (pH 6.2); diffuse, irregular boundary. Horizon is 5 to 9 inches thick.

C—8 to 19 inches, shattered and decomposed, fine-grained, metamorphosed sandstone; slightly acid (pH 6.2).

R—19 inches, metamorphosed, fine-grained sandstone.

The A horizon is slightly acid to medium acid in reaction, brown to dark brown in color, and gravelly loam to loam in texture. The C horizon is 2 to 11 inches thick and is brown to grayish brown in color. Depth to this shattered, weathered, fine-grained metamorphosed sandstone of the Bedford Canyon formation ranges from 8 to 15 inches.

Included with this soil in mapping are small areas of Vallecitos loam, Escondido fine sandy loam, Temescal rocky loam, and Cajalco fine sandy loam. Some small areas having slopes of 5 to 8 percent are also included.

This Lodo soil has moderate permeability. The available water holding capacity is 1.0 to 2.0 inches. Runoff is rapid, and the hazard of erosion is high. The root zone is 8 to 15 inches deep. Natural fertility is very low.

This soil is used for range. (Capability unit VIIe-1 (19) dryland; Shallow Loamy range site)

Lodo rocky loam, 25 to 50 percent slopes, eroded (LpF2).—The hazard of erosion is very high on this soil. Runoff is very rapid.

This soil is used for range. (Capability unit VIIe-1 (19) dryland; Shallow Loamy range site)

Lodo gravelly loam, 15 to 50 percent slopes, eroded (LoF2).—In areas mapped as this soil, rock outcrops cover less than 2 percent of the surface. The hazard of erosion is high, and runoff is rapid. Natural fertility is low.

This soil is used for dryland pasture and range. (Capability unit VIIe-1 (19) dryland; Shallow Loamy range site)

Madera Series

In the Madera series are moderately well drained soils on dissected terraces and old alluvial fans. Slopes are 0 to 15 percent. These soils developed in alluvium consisting mainly of granitic materials. Elevations range from 600 to 1,600 feet. The average annual rainfall ranges from 10 to 13 inches, the average annual temperature from 62° to 65° F., and the average frost-free season from 240 to 310 days. The vegetation is chiefly annual grasses, forbs, and chamise.

In a typical profile, the surface layer is pale-brown and brown fine sandy loam about 19 inches thick. The subsoil is yellowish-brown clay. At a depth of about 26 inches is a yellowish-brown indurated hardpan.

The Madera soils are near the Exeter, Monserate, Chino, and Willows soils.

Madera soils are used for dryland pasture and grain and for irrigated alfalfa, grain, and sugar beets. They are also used for homesites and other nonfarm purposes.

Madera fine sandy loam, 0 to 2 percent slopes (MaA).—This nearly level soil occurs on old alluvial fans.

Following is a typical profile on a north-facing slope of 1 percent (1,160 feet east and 50 feet south of the northwest corner of section 16, T. 5 S., R. 3 W.):

Ap1—0 to 8 inches, pale-brown (10YR 6/3) fine sandy loam, dark brown (10YR 3/3) when moist; weak, medium, granular structure; soft, very friable, nonsticky and nonplastic; abundant very fine and plentiful fine random roots; many fine pores; neutral (pH 7.0); slightly effervescent; abrupt, smooth boundary. Horizon is 7 to 12 inches thick.

Ap2—8 to 14 inches, brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) when moist; weak, medium, subangular blocky structure; soft, very friable, nonsticky and nonplastic; abundant very fine and fine random roots; many very fine pores; neutral (pH 7.0); abrupt, smooth boundary. Horizon is 3 to 10 inches thick.

A3—14 to 19 inches, pale-brown (10YR 6/3) fine sandy loam, brown to dark brown (10YR 4/3) when moist; massive; slightly hard, friable, nonsticky and nonplastic; plentiful very fine and few fine roots; many, very fine and fine pores; slightly acid (pH 6.5); abrupt, wavy boundary. Horizon is 1 to 7 inches thick.

B2t—19 to 26 inches, yellowish-brown (10YR 5/4) clay, dark yellowish brown (10YR 3/4) when moist; moderate, coarse, columnar structure; tops of columns and rounded sides appear coated with a pale-brown or light yellowish-brown dust; common, medium, distinct mottles of brown to dark brown (7.5YR 4/4), reddish brown (5YR 4/4) when moist, on broken peds; very hard, very firm, very sticky and very plastic; plentiful very fine random roots; common, very fine, tubular pores; common moderately thick clay film, brown to dark brown (10YR 4/3), brown (10YR 3/3) when moist; moderately alkaline (pH 8.2); strongly effervescent; medium, irregular-shaped, soft masses of lime; abrupt, wavy boundary. Horizon is 7 to 15 inches thick.

C1m—26 to 37 inches, yellowish-brown (10YR 5/4) indurated hardpan, dark yellowish brown (10YR 4/4) when moist; massive; no roots; few very fine pores; few thin clay films in fracture planes; moderately alkaline (pH 8.4); strongly effervescent; fine seams of lime; abrupt, wavy boundary. Horizon is 11 to 14 inches thick.

C2—37 to 46 inches, yellowish-brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) when moist; massive; extremely hard, firm, sticky and plastic; no roots; common very fine pores; few thin clay films in fracture planes; strongly alkaline (pH 8.6); strongly effervescent; fine seams of lime; abrupt, smooth boundary. Horizon is 12 to 18 inches thick.

C3—46 to 62 inches, yellowish-brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) when moist; massive; very hard, firm, slightly sticky and plastic; no roots; few very fine pores; strongly alkaline (pH 8.6); strongly effervescent; fine seams of lime.

The A horizon is pale brown to dark yellowish brown in color. The Bt horizon is yellowish brown to dark brown. The indurated Cm horizon is moderately to strongly alkaline, strongly effervescent in seams, and yellowish brown to reddish brown. Depth to the hardpan ranges from 18 to 36 inches. Silicates are the principal cementing agent, with lime in the seams.

Included with this soil in mapping are small areas of Exeter very fine sandy loam, Chino silt loam, Monserate sandy loam, and Willows silty clay. Some small included areas have a very fine sandy loam surface layer or a clay loam subsoil. Slightly saline-alkali areas near the edges of basins are also included.

Permeability of this soil is very slow. The available water holding capacity is 4.0 to 5.0 inches. Runoff is slow, and the hazard of erosion is slight. Natural fertility is moderate. The root zone is 18 to 36 inches deep.

This Madera soil is used for dryland grain and pasture, for irrigated sugar beets and alfalfa, and for homesites. (Capability unit IIIs-3 (19) irrigated; Claypan range site)

Madera fine sandy loam, 2 to 5 percent slopes, eroded (MaB2).—The profile of this soil is similar to that described for the Madera series, but the surface layer is yellowish brown and 6 to 12 inches thick.

Included with this soil in mapping are small areas that are 36 to 42 inches deep. Also included are a few small areas that have a very fine sandy loam surface layer and a few small areas that have a sandy clay loam subsoil.

Runoff is slow to medium on this soil. The hazard of erosion is slight to moderate.

This soil is used for dryland grain and pasture and for homesites. (Capability unit IIIe-3 (19) irrigated; Claypan range site)

Madera fine sandy loam, 5 to 15 percent slopes, eroded (MaD2).—The profile of this soil is similar to that described for the Madera series, but it has a brown surface layer.

Included with this soil in mapping are areas with a gravelly fine sandy loam surface layer. A few small areas with a very fine sandy loam surface layer are also included.

Runoff is medium on this soil, and the hazard of erosion is moderate.

This soil is used for dryland grain and pasture and for homesites. (Capability unit IVe–3 (19) irrigated; Claypan range site)

Madera fine sandy loam, shallow, 2 to 8 percent slopes, eroded (MbC2).—Included with this soil in mapping are a few small areas with a loam surface layer. Also included are areas having slopes of 8 to 15 percent.

The available water holding capacity of this soil is 2.0 to 3.0 inches. Runoff is slow to medium, and the hazard of erosion is slight to moderate. The root zone is 10 to 20 inches deep. Natural fertility is moderately low.

This soil is used for dryland grain and pasture and for homesites. (Capability unit IVe-3 (19) irrigated; Claypan range site)

Metz Series

Soils of the Metz series are somewhat excessively drained and occur on alluvial fans. Slopes range from 0 to 15 percent. These soils developed in alluvium from weakly calcareous sandstone and shale. Elevations range from 600 to 2,500 feet. The average annual rainfall ranges from 10 to 14 inches, the average annual temperature from 61° to 64° F., and the average frost-free season from 220 to 230 days. Vegetation is chiefly annual grasses, forbs, willows, and cottonwoods.

In a typical profile, the upper 28 inches is light brownish-gray loamy fine sand. Below this is light brownish-gray loamy coarse sand and light-gray sand.

The Metz soils are near the San Emigdio soils and Riverwash.

Metz soils are used for dryland grain and pasture and for irrigated truck crops, citrus, olives, apricots, and alfalfa. They are also used for homesites.

Metz loamy fine sand, 0 to 2 percent slopes (MfA).—This nearly level soil occurs on alluvial fans.

Following is a typical profile on a southwest-facing slope of 1 percent (370 feet north and 100 feet west of the center of section 9, T. 5 S., R. 1 E.):

C1—0 to 28 inches, light brownish-gray (10YR 6/2) loamy fine sand, very dark grayish brown (10YR 3/2) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; abundant very fine roots; very porous; mildly alkaline (pH 7.8); slightly effervescent; clear, wavy boundary. Horizon is 6 to 28 inches thick.

C2—28 to 48 inches, light brownish-gray (10YR 6/2) loamy coarse sand, very dark grayish brown (10YR 3/2) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; plentiful very fine roots; very porous; mildly alkaline (pH 7.8); slightly effervescent; gradual, wavy boundary. Horizon is 8 to 22 inches thick.

C3—48 to 60 inches, light-gray (2.5Y 7/2) sand, light brownish gray (2.5Y 6/2) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; few very fine roots; very porous; mildly alkaline (pH 7.8); slightly effervescent.

The C1 horizon is neutral to mildly alkaline in reaction and light grayish brown to grayish brown. The C2 and C3 horizons are mildly to moderately alkaline, grayish brown to light gray loamy fine sand to sand.

Included with this soil in mapping are small areas of San Emigdio fine sandy loam or loam. Some small areas with a sandy loam substratum and a gravelly loamy fine sand surface layer are also included.

Permeability of this soil in rapid. Runoff is slow, and the hazard of erosion is slight. The available water holding capacity is 3.75 to 5.0 inches. The root zone is more than 60 inches deep. Natural fertility is low.

This Metz soil is used for irrigated olives, alfalfa, and truck crops, for dryland grain and pasture, and for homesites. (Capability unit IIIs–4 (19) irrigated; Sandy range site)

Metz loamy fine sand, gravelly sand substratum, 0 to 5 percent slopes (MgB).—The profile of this soil is similar to that described for the Metz series, but it is 30 to 42 inches deep over gravelly coarse sand.

A few small areas having a loamy sand surface layer are included with this soil in mapping. Also included are areas, comprising about one-tenth of the mapping unit, where the gravelly coarse sand substratum is at a depth of 10 to 30 inches.

Runoff is slow on this soil, and the hazard of erosion is slight. The available water holding capacity is 2.5 to 4.0 inches. The root zone is 30 to 42 inches thick. Natural fertility is moderate.

This soil is used for irrigated alfalfa, truck crops, apricots, and olives, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IVs–0 (19) irrigated; Sandy range site)

Metz loamy fine sand, sandy loam substratum, 0 to 5 percent slopes (MhB).—The profile of this soil is similar to that described for the Metz series, but it is 20 to 36 inches deep over sandy loam.

A few areas with a loamy sand surface layer and a loam substratum are included with this soil in mapping. Also included are areas on slopes of 5 to 15 percent.

The available water holding capacity of this soil is 5.5 to 7.0 inches. Runoff is slow to medium, and the hazard of erosion is slight to moderate. Natural fertility is moderate.

This soil is used for irrigated alfalfa, truck crops, citrus, olives, and apricots. It is also used for dryland grain and pasture and for nonfarm purposes. (Capability unit IIs—4 (19) irrigated; Sandy range site)

Metz loamy sand, 2 to 8 percent slopes (MdC).—The profile of this soil is similar to that described for the Metz series, but it has a loamy sand surface layer.

Included with this soil in mapping are a few small areas of loamy fine sand, some of which are 36 to 60 inches deep over gravelly coarse sand. Also included are areas on slopes of 8 to 15 percent.

The available water holding capactiy of this soil is 3.75 to 5.0 inches. Runoff is slow, and the hazard of erosion is slight.

This soil is used for irrigated citrus, olives, apricots, alfalfa, and truck crops. It is also used for dryland grain and pasture and for nonfarm purposes (Capability unit IIIs–4 (19) irrigated; Sandy range site)

Metz loamy sand, channeled, 0 to 15 percent slopes (MeD).—The profile of this soil is similar to that described for the Metz series, but it has a loamy sand texture throughout and is channeled.

Included with this soil in mapping are a few areas

having a cobbly loamy sand, loamy fine sand, gravelly sandy loam, or sandy loam surface layer. Approximately one-tenth of the acreage consists of included small areas that have a gravelly loamy sand surface layer. A few small areas having slopes of 15 to 25 percent are included. Small areas with a water table below a depth of 42 inches are also included.

The hazard of erosion on this soil is very high. The available water holding capacity is 3.0 to 5.0 inches.

This soil is used for pasture and range. It is also used as a wildlife habitat and as a source of water. (Capability unit VIIw-4 (19) dryland; Sandy Alluvial range site)

Metz gravelly sandy loam, 2 to 15 percent slopes (MID).—The profile of this soil is similar to that described for the Metz series, but it has a gravelly sandy loam surface layer.

Included with this soil in mapping are a few small areas with a cobbly sandy loam surface layer and a fine sandy loam substratum. Some included areas have gravelly coarse sand at a depth of 36 to 60 inches. Small areas subject to stream channel erosion, soils on slopes of 0 to 2 percent, and soils having a gravelly loamy sand surface layer are also included.

The available water holding capacity of this soil is 5.0 to 7.5 inches. Runoff is slow to medium, and the hazard of erosion is slight to moderate. Permeability is moderately rapid. Natural fertility is moderate.

This soil is used for dryland pasture and grain, for irrigated olives and citrus, and for homesites. (Capability unit IIIs-4 (19) irrigated; Sandy range site)

Monserate Series

The Monserate series consists of well-drained soils that developed in alluvium from predominantly granitic materials. Slopes range from 0 to 25 percent. These soils are on terraces and on old alluvial fans. Elevations range from 700 to 2,500 feet. The average annual rainfall ranges from 9 to 14 inches, the average annual temperature from 61° to 64° F., and the average frost-free season from 220 to 280 days. Vegetation is chiefly annual grasses, forbs, and chamise.

In a typical profile, the surface layer is brown and yellowish-red sandy loam about 10 inches thick. The subsoil is reddish-brown sandy clay loam. At a depth of about 28 inches is a dark-brown layer that is cemented with iron and silica. The cementation decreases with depth, and the material contains seams that are slightly effervescent.

The Monserate soils are near the Tujunga, Hanford, Greenfield, and Ramona soils.

Monserate soils are used for dryland grain and pasture, for irrigated citrus and truck crops, and for nonfarm purposes.

Monserate sandy loam, 5 to 8 percent slopes, eroded (MmC2).—This moderately sloping soil occurs on terraces and fans.

Following is a typical profile on a south-facing slope of 6 percent (1,200 feet east and 150 feet north of the southwest corner of section 33, T. 2 S., R. 3 W.):

Ap—0 to 5 inches, brown (7.5YR 5/4) sandy loam, dark reddish brown (5YR 3/4) when moist; moderate, medium, granular structure; slightly hard, friable, nonsticky and nonplastic; abundant fine roots; many, fine, tubular pores; slightly acid (pH 6.2); clear, smooth boundary. Horizon is 2 to 8 inches thick.

A3—5 to 10 inches, yellowish-red (5YR 4/6) sandy loam, dark reddish brown (2.5YR 3/4) when moist; moderate, medium, subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine roots; many, fine, tubular pores; slightly acid (pH 6.5); abrupt, smooth boundary. Horizon is 3 to 6 inches thick.

B21t—10 to 20 inches, reddish-brown (5YR 4/4) sandy clay loam, dark reddish brown (2.5YR 3/4) when moist; strong, medium, prismatic structure; extremely hard, very firm, very sticky and very plastic; few fine, mostly exped roots; few, fine, tubular pores; many moderately thick clay films in pores and on ped faces; neutral (pH 6.7); gradual, smooth boundary. Horizon is 5 to 10 inches thick.

B22t—20 to 28 inches, reddish-brown (5YR 5/4) sandy clay loam, dark reddish brown (5YR 3/4) when moist; strong, medium, angular blocky structure; extremely hard, very sticky and very plastic; few fine, mostly exped roots; few, fine, tubular pores; many moderately thick clay films in pores and on ped faces; neutral (pH 7.2); abrupt, wavy boundary. Horizon is 8 to 12 inches thick.

C1m—28 to 45 inches, dark-brown (10YR 4/3) indurated hardpan, dark reddish brown (5YR 3/4) when moist; massive; very few roots in seams and fissures; sometimes lime and/or purplish-black manganese stains in seams; mildly alkaline (pH 7.7); gradual, smooth boundary. Horizon is 5 to 20 inches thick.

C2—45 to 57 inches, yellowish-brown (10YR 5/4) loamy coarse sand, dark reddish brown (5YR 3/4) when moist; massive; weakly cemented; very hard, firm, nonsticky and nonplastic; mildly alkaline (pH 7.6); clear, wavy boundary. Horizon is 3 to 18 inches thick.

C3—57 to 70 inches, yellowish-brown (10YR 5/4) loamy coarse sand, dark reddish brown (5YR 3/4) when moist; massive; weakly cemented in lenses; soft, very friable, nonsticky and nonplastic; mildly alkaline (pH 7.5).

The A horizon is slightly acid to neutral in reaction and brown, grayish brown, or reddish brown to yellowish red in color. The Bt horizon is grayish brown to reddish brown in color and sandy clay loam to clay loam in texture. The Cm horizon is an iron-silica cemented hardpan, which sometimes has manganese stains in a dendritic pattern in seams and becomes dark-brown to yellowish-brown coarse sandy loam to loamy coarse sand. Depth to the hardpan commonly ranges from 20 to 36 inches.

Included with this soil in mapping are small areas of Tujunga loamy sand, Hanford coarse sandy loam, Greenfield sandy loam, and Ramona sandy loam. Also included are some small areas with a gravelly sandy loam surface layer, and areas that are 36 to 54 inches deep to the hardpan.

Permeability of this soil above the nearly impervious pan is moderately slow. Runoff is medium, and the hazard of erosion is moderate. The available water holding capacity is 4.0 to 6.0 inches. The root zone is 20 to 36 inches deep. Natural fertility is moderate.

This Monserate soil is used for irrigated citrus, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IIIe-8 (19) irrigated; Loamy range site)

Monserate sandy loam, 0 to 5 percent slopes (MmB).—The profile of this soil is similar to that described for the Monserate series, but it has a sandy clay subsoil.

Included with this soil in mapping are a few small gravelly areas with less clay in the subsoil than is typical. Also included are areas that are 36 to 54 inches deep to the silica-cemented pan. Some inclusions have slopes of 5 to 8 percent.

The hazard of erosion is slight on this soil, and runoff is slow.

This soil is used for irrigated truck crops and citrus, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IIIe–8 (19) irrigated; Loamy range site)

Monserate sandy loam, 8 to 15 percent slopes, eroded (MmD2).—Included with this soil in mapping are small areas that are 36 to 54 inches deep to the silica-cemented pan. Some small areas having slopes of 15 to 25 percent and some areas with less clay in the subsoil are also included. About one-tenth of the acreage is made up of inclusions where the surface layer is fine sandy loam.

Runoff is medium on this soil, and the hazard of erosion is moderate.

This soil is used for irrigated citrus, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IVe–8 (19) irrigated; Loamy range site)

Monserate sandy loam, 15 to 25 percent slopes, severely eroded (MmE3).—Many areas of this soil have an exposed subsoil. The hazard of erosion is very high, and runoff is very rapid. The available water holding capacity is 2.0 to 4.0 inches. The root zone is 10 to 20 inches deep.

This soil is used for range, dryland pasture, and some grain. (Capability unit VIe–8 (19) dryland; Loamy range site)

Monserate sandy loam, shallow, 5 to 15 percent slopes, eroded (MnD2).—The profile of this soil is similar to that described for the Monserate series, but it is 10 to 20 inches deep to the silica-cemented pan, has a reddish-brown surface layer, and a sandy clay subsoil.

Included with this soil in mapping are small areas that have a gravelly sandy loam surface layer. Also included are small areas having slopes of less than 5 percent.

The available water holding capacity of this soil is 2.0 to 3.0 inches. Runoff is rapid, and the hazard of erosion is high. Natural fertility is moderately low.

This soil is used for dryland pasture and grain and for nonfarm purposes. (Capability unit VIe–8 (19) dryland; Shallow Loamy range site)

Monserate sandy loam, shallow, 15 to 25 percent slopes, severely eroded (MnE3).—The profile of this soil is similar to that described for the Monserate series, but it is 10 to 20 inches deep to the silica-cemented pan, has a reddish-brown surface layer, and has a sandy clay subsoil. Many small areas of exposed subsoil and many gullies and rills occur.

Included with this soil in mapping are a few small areas with a gravelly sandy loam surface layer.

The available water holding capacity of this soil is 2.0 to 4.0 inches. Runoff is very rapid, and the hazard of erosion is very high. Natural fertility is moderately low.

This soil is used for range. (Capability unit VIIe–1 (19) dryland; Shallow Loamy range site)

Mottsville Series

In the Mottsville series are excessively drained soils on alluvial fans and in valley fills. These soils developed in alluvium from predominantly acid igneous materials. Slopes are 2 to 25 percent. Elevations range from 3,500 to 6,000 feet. The average annual rainfall ranges from 14 to 25 inches, the average annual temperature from 55° to 59° F., and the average frost-free season from 100 to 180 days. Vegetation is chiefly annual grasses, forbs, big sagebrush, scrub oaks, and ceanothus. In addition, there are a few oaks and sugar pines.

Typically, the surface layer is dark grayish-brown loamy sand about 30 inches thick. The underlying material is grayish-brown loamy coarse sand.

The Mottsville soils are near the Oak Glen and Calpine soils.

Mottsville soils are used for range, for dryland pasture and grain, and for irrigated apples, peaches, potatoes, and alfalfa. These soils are also used for nonfarm purposes.

Mottsville loamy sand, 2 to 8 percent slopes (MoC).—This gently to moderately sloping soil is on alluvial fans and in valley fills.

Following is a typical profile on a west-facing slope of 2 percent (800 feet north and 1,760 feet west of the southeast corner of section 31, T. 7 S., R. 5 E.):

A11—0 to 6 inches, dark grayish-brown (10YR 4/2) loamy sand, very dark grayish brown (10YR 3/2) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; abundant fine and very fine roots; slightly acid (pH 6.2); clear, smooth boundary. Horizon is 4 to 10 inches thick.

A12—6 to 30 inches, dark grayish-brown (10YR 4/2) loamy sand, very dark grayish brown (10YR 3/2) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; plentiful fine and very fine roots; slightly acid (pH 6.2); clear, smooth boundary. Horizon is 14 to 24 inches thick.

C1—30 to 60 inches, grayish-brown (10YR 5/2) loamy coarse sand, very dark grayish brown (10YR 3/2) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; plentiful very fine and few medium roots; slightly acid (pH 6.2).

The A horizon is slightly acid to medium acid in reaction, grayish brown to dark gray in color, and sand to loamy sand in texture. The C horizon is generally slightly acid to neutral, grayish-brown to pale-brown loamy sand to gravelly loamy coarse sand.

Included with this soil in mapping are small areas of Oak Glen fine sandy loam and Calpine sandy loam. Some areas are included that have a gravelly loamy sand or loamy fine sand surface layer. Areas braided with stream channels are also included.

Permeability of this soil is rapid. Runoff is medium, and the hazard of erosion is moderate. The available water holding capacity is 3.75 to 5.0 inches. The root zone is more than 60 inches deep. Natural fertility is moderate.

This Mottsville soil is used for irrigated apples, peaches, alfalfa, and potatoes, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IIIs–4 (20) irrigated, IVsc 4 (20) dryland; Coarse Sandy range site)

Mottsville loamy sand, 8 to 15 percent slopes (MoD).—Generally, this soil contains some fine gravel. Otherwise, its profile is similar to that described for the Mottsville series.

Included with this soil in mapping are small areas that have a gravelly loamy sand surface layer, areas with a sandy loam substratum, and areas that are braided with stream channels. Also included are areas having slopes of 15 to 25 percent.

Runoff is medium on this soil, and the hazard of erosion is moderate.

This soil is used for dryland pasture and grain and for nonfarm purposes. (Capability unit IVs–4 (20) irrigated, IVsc–4 (20) dryland; Coarse Sandy range site)

Mottsville cobbly loamy sand, 8 to 25 percent slopes (MrE).—The profile of this soil is similar to that described for the Mottsville series, but it has a cobbly loamy sand surface layer. This mapping unit is channeled by intermittent streams.

Included with this soil in mapping are areas that are not channeled and that have slopes of 2 to 8 percent.

The available water holding capacity of this soil is 2.5 to 3.0 inches. Runoff is medium to rapid, and the hazard of erosion is very high. Natural fertility is low.

This soil is used for dryland pasture and range and for nonfarm purposes. (Capability unit VIIw-4 (20) dryland; Coarse Sandy range site)

Mottsville sandy loam, 2 to 8 percent slopes (MsC).—The profile of this soil is similar to that described for the Mottsville series, but it has a sandy loam surface layer. Included in mapping are some small areas with braided stream channels.

The available water holding capacity of this soil is 6.0 to 7.5 inches. Runoff is slow, and the hazard of erosion is slight. Natural fertility is high.

This soil is used for irrigated potatoes and orchards, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IIIs-4 (20) irrigated, IVsc-4 (20) dryland; Coarse Sandy range site)

Mottsville sandy loam, 8 to 15 percent slopes (MsD).—The profile of this soil is similar to that described for the Mottsville series, but it has a sandy loam surface layer.

Included with this soil in mapping are some small areas that have a fine sandy loam or very fine sandy loam surface layer. Also included are some areas with braided stream channels.

The available water holding capacity of this soil is 6.0 to 7.5 inches. The hazard of erosion is moderate. Natural fertility is high.

This soil is used for irrigated apples, peaches, and potatoes, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IIIs-4 (20) irrigated, IVsc-4 (20) dryland; Coarse Sandy range site)

Mottsville cobbly sandy loam, 8 to 25 percent slopes, eroded (MtE2).—The profile of this soil is similar to that described for the Mottsville series, but it has a cobbly sandy loam surface layer. Shallow gullies occur. There are small areas of recent streambank cutting and deposition.

Included with this soil in mapping are some areas braided with stream channels. A few areas are included that have slopes of 2 to 8 percent.

Runoff is medium on this soil, and the hazard of erosion is moderate. The available water holding capacity is 3.0 to 4.5 inches.

This soil is used for dryland pasture and range. (Capability unit VIs-7 (20) dryland; Coarse Sandy range site)

Murrieta Series

Soils of the Murrieta series developed on olivine basalt. These well-drained soils are on lava flows. Slopes are 2 to 25 percent. Elevations range from 1,700 to 2,500 feet. The average annual rainfall ranges from 14 to 20 inches, the average annual temperature from 59° to 62° F., and the average frost-free season from 260 to 300 days. Vegetation is chiefly annual grasses, tarweed, and forbs.

In a typical profile, the surface layer is dark-red stony clay loam about 5 inches thick. The subsoil is dark-red and dark reddish-gray heavy clay loam and clay. At a depth of about 17 inches is hard olivine basalt.

The Murrieta soils are near the Las Posas soils, and they are used for pasture and range.

Murrieta stony clay loam, 2 to 25 percent slopes (MuE).—This undulating to hilly soil occurs on lava flows.

Following is a typical profile on a south-facing slope of 2 percent (1,150 feet north and 1,300 feet east of the west quarter corner of section 2, T. 8 S., R. 4 W.):

A—0 to 5 inches, dark-red (2.5YR 3/6) stony clay loam, dark reddish brown (2.5YR 3/4) when moist; moderate, fine, angular blocky structure; hard, firm, slightly sticky and plastic; abundant very fine roots; common, very fine, irregular and tubular pores; medium acid (pH 5.6); clear, wavy boundary. Horizon is 3 to 8 inches thick.

B1—5 to 9 inches, dark-red (2.5YR 3/6) heavy clay loam, dark reddish brown (2.5YR 3/4) when moist; moderate, medium, angular blocky structure; hard, firm, sticky and plastic; abundant very fine roots; common, very fine, irregular and tubular pores; common thin clay films on peds and in pores; medium acid (pH 5.6); abrupt, wavy boundary. Horizon is 3 to 4 inches thick.

B21t—9 to 13 inches, dark-red (2.5YR 3/6) clay, dark reddish brown (2.5YR 3/4) when moist; strong, coarse, prismatic structure, the prisms being irregular and high in apparent volume weight; extremely hard, extremely firm, very sticky and very plastic; plentiful very fine roots; common, very fine, tubular pores; continuous thick clay films on ped faces; medium acid (pH 5.6); clear, wavy boundary. Horizon is 2 to 5 inches thick.

B22t—13 to 17 inches, dark reddish-gray (5YR 4/2) clay, dark reddish gray (5YR 4/2) when moist; strong, coarse, prismatic structure; extremely hard, extremely firm, very sticky and very plastic; plentiful very fine roots; common, very fine, tubular pores; continuous thick clay films on ped faces; medium acid (pH 6.0); abrupt, wavy boundary. Horizon is 4 to 11 inches thick.

R—17 inches, gray olivine basalt, mottled with red and yellow; many cavities from gas bubbles; plentiful very fine roots on surface of rock fragments. Many feet thick.

The A horizon is slightly acid to medium acid in reaction and reddish brown to dark red in color. The Bt horizon is dark-red to dark reddish-gray heavy clay loam to clay. Depth to hard basalt commonly ranges from 12 to 20 inches.

Included with this soil in mapping are small areas of Las Posas loam. Some small depressional areas and some unnamed moderately deep soils with a clay loam subsoil are also included.

Permeability of this soil is slow. Runoff is slow to rapid, and the hazard of erosion is slight to high. The available water holding capacity is 2.0 to 3.0 inches. The root zone is 12 to 20 inches deep. Natural fertility is moderate.

This Murrieta soil is used for pasture and range. (Capability unit VIe-7 (19) dryland; Shallow Clayey range site)

Oak Glen Series

The Oak Glen series consists of well-drained soils on alluvial fans and in valley fills. Slopes range from 5 to 25 percent. These soils developed in alluvium predominantly from granitic and metamorphosed granitic rock. Elevations range from 3,500 to 6,000 feet. The average annual rainfall ranges from 10 to 25 inches, the average annual temperature from 50° to 57° F., and the average frost-free season from 150 to 225 days. Vegetation is chiefly annual grasses, forbs, big sagebrush, ceanothus, and scrub oaks, and there are a few sugar pines.

Typically, the surface layer is brown fine sandy loam about 29 inches thick. The substratum is reddish-brown fine sandy loam and extends to a depth of 60 inches or more.

The Oak Glen soils are near the Mottsville and Calpine soils.

Oak Glen soils are used for dryland grain, pasture, and range and for irrigated peaches, apples, potatoes, and alfalfa. They are also used for nonfarm purposes.

Oak Glen fine sandy loam, 5 to 15 percent slopes (OkD).—This moderately to strongly sloping soil occurs on alluvial fans and in valley fills.

Following is a typical profile on a south-southwest-facing slope of 6 percent (1,800 feet north and 1,100 feet west of the south quarter corner of section 19, T. 2 S., R. 1 E.):

Ap—0 to 11 inches, brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) when moist; weak, medium, angular blocky structure parting to weak, fine, crumb structure or single grain; soft, very friable, nonsticky and nonplastic; abundant fine and common very fine roots; medium acid (pH 6.0); abrupt, smooth boundary. Horizon is 6 to 15 inches thick.

A1—11 to 29 inches, brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) when moist; weak, coarse, subangular blocky structure parting to weak, fine, subangular blocky structure; soft, very friable, nonsticky and nonplastic; plentiful fine and abundant very fine roots; abundant, fine, irregular pores; medium acid (pH 6.0); clear, smooth boundary. Horizon is 9 to 20 inches thick.

C1—29 to 39 inches, reddish-brown (5YR 4/4) fine sandy loam, dark reddish brown (5YR 3/3) when moist; weak, medium, subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; abundant very fine and few fine roots; many, very fine, irregular pores and few, very fine, tubular pores; medium acid (pH 6.0); gradual, smooth boundary. Horizon is 8 to 16 inches thick.

C2—39 to 60 inches, reddish-brown (5YR 4/4) fine sandy loam, dark reddish brown (5YR 3/4) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; abundant, very fine, irregular pores; medium acid (pH 6.0).

The A horizon is slightly acid to medium acid in reaction, gray to very dark grayish brown or brown in color, and fine sandy loam to sandy loam in texture. The C horizon is slightly acid to medium acid, grayish brown to reddish brown, and very fine sandy loam to sandy loam. The lower C horizon may be coarser textured and gravelly or very gravelly.

Included with this soil in mapping are small areas of Mottsville loamy sand and Calpine sandy loam. Also included are some small areas with a gravelly sandy loam or very fine sandy loam surface layer. Some inclusions have braided stream channels; others are on slopes of 2 to 5 percent. Small overwash areas of loamy sand are also included.

Permeability of this soil is moderately rapid. Runoff is slow to medium, and the hazard of erosion is slight to moderate. The available water holding capacity is 7.5 to 9.0 inches. The root zone is more than 60 inches deep. Natural fertility is high.

This Oak Glen soil is used for irrigated peaches, apples, potatoes, and alfalfa and for nonfarm purposes. (Capability unit IIIe-1 (20) irrigated, IVec-1 (20) dryland; Loamy Uplands range site)

Oak Glen gravelly sandy loam, 8 to 15 percent slopes (OgD).—The profile of this soil is similar to that described for the Oak Glen series, but it has a gravelly sandy loam surface layer and generally is gravelly loamy sand below a depth of 48 inches.

Included with this soil in mapping are small areas that have a gravelly very fine sandy loam surface layer. Some very gravelly areas are also included.

Runoff is medium on this soil, and the hazard of erosion is moderate. The available water holding capacity is 4.5 to 7.5 inches. Natural fertility is moderate.

This soil is used for irrigated peaches, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IIIe-1 (20) irrigated, IVec-1 (20) dryland; Loamy Uplands range site)

Oak Glen gravelly sandy loam, 15 to 25 percent slopes (OgE).—The profile of this soil is similar to that described for the Oak Glen series, but it has a gravelly sandy loam surface layer and generally is gravelly loamy sand below a depth of 48 inches.

Included with this soil in mapping are areas with a sandy loam surface layer. Also included are small areas that have slopes of 25 to 35 percent.

The available water holding capacity of this soil is 4.5 to 7.5 inches. Runoff is rapid, and the hazard of erosion is high. Natural fertility is moderate.

This soil is used for dryland pasture and grain, for irrigated peaches, and for nonfarm purposes. (Capability unit IVe-1 (20) irrigated, IVec-1 (20) dryland; Loamy Uplands range site)

Pachappa Series

In the Pachappa series are well-drained soils that developed in predominantly granitic alluvium. Slopes are 0 to 8 percent. Elevations range from 600 to 1,700 feet. The average annual rainfall ranges from 9 to 14 inches, the average annual temperature from 61° to 65° F., and the average frost-free season from 220 to 280 days. Vegetation is chiefly annual grasses, forbs, and chamise.

In a typical profile, the surface layer is brown fine sandy loam and very fine sandy loam about 20 inches thick. The subsoil is brown and pale-brown loam and very fine sandy loam about 29 inches thick. The substratum is very pale brown very fine sandy loam.

The Pachappa soils are near the Hanford, Greenfield, and San Emigdio soils.

Pachappa soils are used for dryland grain and pasture and for irrigated citrus, alfalfa, truck crops, and walnuts. They are also used for homesites and other nonfarm uses.

Pachappa fine sandy loam, 2 to 8 percent slopes, eroded (PaC2).—This gently to moderately sloping soil occurs on alluvial fans.

Following is a typical profile on a west-facing slope of 2 percent (600 feet east and 200 feet south of the north quarter corner of section 13, T. 2 S., R. 5 W.):

Ap—0 to 8 inches, brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) when moist; moderate, fine, granular structure; slightly hard, friable, slightly sticky and nonplastic; plentiful fine roots; common medium pores; slightly acid (pH 6.5); gradual, smooth boundary. Horizon is 7 to 12 inches thick.

A1—8 to 20 inches, brown (10YR 5/3) very fine sandy loam, dark brown (10YR 3/3) when moist; moderate, fine, subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; plentiful fine roots; common medium pores; neutral (pH 7.2); gradual, smooth boundary. Horizon is 4 to 12 inches thick.

B21t—20 to 29 inches, brown (10YR 5/3) loam, dark brown (10YR 3/3) when moist; strong, medium, granular structure and strong, medium, angular blocky structure; hard, firm, sticky and plastic; plentiful fine roots; common fine pores; mildly alkaline (pH 7.5); strongly effervescent; gradual, smooth boundary. Horizon is 7 to 14 inches thick.

B22t—29 to 40 inches, pale-brown (10YR 6/3) loam, brown to dark brown (10YR 4/3) when moist; strong, medium, subangular blocky structure; hard, firm, sticky and plastic; plentiful fine roots; common fine pores; mildly alkaline (pH 7.5); strongly effervescent; clear, wavy boundary. Horizon is 10 to 14 inches thick.

B3t—40 to 49 inches, pale-brown (10YR 6/3) very fine sandy loam, brown to dark brown (10YR 4/3) when moist; strong, fine, subangular blocky structure; slightly hard, firm, slightly sticky and nonplastic; few fine roots; few fine pores; mildly alkaline (pH 7.5); strongly effervescent; gradual, smooth boundary. Horizon is 6 to 9 inches thick.

C1—49 to 63 inches, very pale brown (10YR 7/3) very fine sandy loam, brown (10YR 5/3) when moist; strong, fine, subangular blocky structure; slightly hard, firm, slightly sticky and nonplastic; few fine roots; few fine pores; moderately alkaline (pH 8.0); violently effervescent.

The A horizon is neutral to slightly acid in reaction, brown to dark grayish brown in color, and sandy loam to very fine sandy loam in texture. The B horizon is mildly alkaline to moderately alkaline, pale-brown to dark-brown sandy loam to light sandy clay loam. The C horizon is very pale brown to dark grayish-brown sandy loam to very fine sandy loam.

Included with this soil in mapping are small areas of San Emigdio sandy loam, Hanford coarse sandy loam, and Greenfield sandy loam. Some small areas that have slopes of 8 to 15 percent are also included.

Permeability of this soil is moderate. Runoff is medium, and the hazard of erosion is moderate. The available water holding capacity is 7.5 to 10.0 inches. The root zone is greater than 60 inches deep. Natural fertility is high.

This Pachappa soil is used for irrigated citrus, alfalfa, and truck crops, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IIe-1 (19) irrigated; Loamy range site)

Pachappa fine sandy loam, 0 to 2 percent slopes (PaA).—About one-tenth of the acreage mapped as this soil consists of included small areas that are calcareous fine sandy loam throughout the profile. Also included are small areas with a loamy fine sand surface layer, some unnamed slightly saline-alkali loam soils along the basin edges, and a few small eroded areas.

The available water holding capacity of this soil is 7.5 to 10.0 inches. Runoff is slow, and the hazard of erosion is slight.

This soil is used for irrigated walnuts, alfalfa, and truck crops, for dryland grain and pasture, and for nonfarm purposes. (Capability unit I-1 (19) irrigated; Loamy range site)

Perkins Series

In the Perkins series are well-drained soils on alluvial fans and terraces. These soils developed in alluvium that was derived mainly from metasedimentary, fine-grained sandstone. Slopes are 2 to 15 percent. Elevations range from 500 to 2,000 feet. The average annual rainfall ranges from 9 to 14 inches, the average annual temperature from 61° to 65° F., and the average frost-free season from 230 to 280 days. Vegetation is chiefly annual grasses, forbs, chamise, and salvia.

Typically, the surface layer is brown gravelly loam about 12 inches thick. The subsoil is reddish-brown and dark reddish-brown gravelly clay loam about 32 inches thick. The substratum is brown very gravelly sandy clay loam.

The Perkins soils are near the Garretson, Cortina, and Arbuckle soils.

Perkins soils are used for dryland grain and pasture, for irrigated citrus, and for nonfarm purposes. Areas of Perkins soils are near the city of Corona.

Perkins gravelly loam, 5 to 8 percent slopes (PgC).—This moderately sloping soil occurs on alluvial fans and terraces.

Following is a typical profile on a northeast-facing slope of 8 percent (1,000 feet north and 700 feet east of the southwest corner of section 18, T. 4 S., R. 6 W.):

A11—0 to 7 inches, brown (7.5YR 5/4) gravelly loam, dark reddish brown (5YR 3/4) when moist; weak, coarse, angular blocky structure parting to moderate, medium, granular structure; slightly hard, firm, slightly sticky and slightly plastic; abundant very fine and few fine roots; common, very fine pores; surface one-half inch tends to be soft, very fine, and granular and contains a considerable amount of organic matter; slightly acid (pH 6.1); clear, wavy boundary. Horizon is 3 to 8 inches thick.

A12—7 to 12 inches, brown (7.5YR 5/4) gravelly loam, dark reddish brown (5YR 3/4) when moist; moderate, medium, angular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; abundant very fine and few fine roots; common fine pores; slightly acid (pH 6.1); clear, wavy boundary. Horizon is 5 to 8 inches thick.

B1—12 to 15 inches, reddish-brown (2.5YR 4/4) gravelly clay loam, dark reddish brown (2.5YR 3/4) when moist; moderate, medium, angular blocky structure; hard, very firm, sticky and plastic; plentiful very fine roots; many medium pores; thin discontinuous clay films in pores; soil particles appear platy when magnified; slightly acid (pH 6.5); gradual, smooth boundary. Horizon is 3 to 11 inches thick.

B21t—15 to 23 inches, dark reddish-brown (2.5YR 3/4, dry or moist) gravelly heavy clay loam; moderate, fine, subangular blocky structure; very hard, very firm, very sticky and plastic; plentiful very fine roots; few, medium, tubular pores; continuous moderately thick clay films in pores and on ped faces; slightly acid (pH 6.5); gradual, wavy boundary. Horizon is 6 to 10 inches thick.

B22t—23 to 30 inches, dark reddish-brown (2.5YR 3/4, dry or moist) gravelly heavy clay loam; moderate, fine, subangular blocky structure; very hard, very firm, very sticky and plastic; few very fine roots; few, fine, tubular pores; continuous moderately thick clay films in pores and on ped faces; neutral (pH 7.0); gradual, wavy boundary. Horizon is 4 to 16 inches thick.

B23t—30 to 36 inches, similar to horizon above but reddish brown (2.5YR 4/4) when moist; many rock fragments. Horizon is 6 to 10 inches thick.

B3—36 to 44 inches, dark reddish-brown (2.5YR 3/4) gravelly heavy clay loam, reddish brown (2.5YR 4/4) when moist; moderate, fine, subangular blocky structure; very hard, very firm, very sticky and plastic; few very fine roots; few, fine, tubular pores; continuous moderately thick clay films in pores and on ped faces; neutral (pH 6.8); many rock fragments; clear, wavy boundary. Horizon is 8 to 14 inches thick.

C1—44 to 50 inches, brown (7.5YR 5/4) very gravelly sandy clay loam, reddish brown (5YR 4/4) when moist; massive; slightly hard, firm, sticky and plastic; continuous moderately thick clay films in pores; neutral (pH 6.8); gradual, wavy boundary. Horizon is 6 to 8 inches thick.

C2—50 to 60 inches, similar to horizon above but with many moderately thick clay films in pores. Many feet thick.

The A horizon is slightly acid to neutral in reaction, light yellowish brown to brown in color, and gravelly fine sandy loam to gravelly loam in texture. The Bt horizon is neutral

to slightly acid, reddish-brown to dark reddish-brown heavy clay loam to clay with or without gravel. The C horizon is slightly acid to neutral, grayish-brown to brown sandy clay loam to very gravelly sandy clay loam.

Included with this soil in mapping are small areas of Arbuckle gravelly loam and Garretson gravelly very fine sandy loam.

Permeability of this soil is slow. Runoff is medium, and the hazard of erosion is moderate. The available water holding capacity is 6.5 to 7.5 inches. The root zone is more then 60 inches deep. Natural fertility is moderate.

This Perkins soil is used for irrigated citrus, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IIIe-3 (19) irrigated; Claypan range site)

Perkins gravelly loam, 2 to 5 percent slopes (PgB).—Included with this soil in mapping are small areas of Arbuckle gravelly loam and Garretson gravelly very fine sandy loam.

Runoff is slow, and the hazard of erosion is slight. The available water holding capacity is 6.5 to 7.5 inches.

This soil is used for irrigated citrus, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IIIe-3 (19) irrigated; Claypan range site)

Perkins loam, 2 to 8 percent slopes (PeC).—The profile of this soil is similar to that described for the Perkins series, but it has a loam surface layer essentially free of gravel. In a few areas the depth to the subsoil is about 12 to 15 inches.

Included with this soil in mapping are some areas with a fine sandy loam or very fine sandy loam surface layer. Some inclusions are on slopes of 8 to 15 percent.

The available water holding capacity of this soil is 9.0 to 10.5 inches.

This soil is used for irrigated citrus, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IIIe-3 (19) irrigated; Claypan range site)

Perkins gravelly loam, 8 to 15 percent slopes, eroded (PgD2).—Moderately deep and deep gullies have been formed in this soil. There are small areas of deposition.

Included with this soil in mapping are a few small areas having a loam or fine sandy loam surface layer that is essentially free of gravel. Small areas of Perkins soils that have slopes of 15 to 25 percent are also included.

The available water holding capacity of this soil is 6.5 to 7.5 inches. Runoff is rapid, and the hazard of erosion is high.

This soil is used for irrigated citrus, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IVe-3 (19) irrigated; Claypan range site)

Placentia Series

The Placentia series consists of moderately well drained soils on alluvial fans and terraces. Slopes range from 0 to 25 percent. These soils developed in alluvium consisting mainly of granitic materials. Elevations range from 600 to 2,200 feet. The average annual rainfall ranges from 10 to 14 inches, the average annual temperature from 60° to 64° F., and the average frost-free season from 200 to 270 days. The vegetation is chiefly annual grasses, forbs, and chamise.

In a typical profile, the surface layer is brown and pale-brown fine sandy loam and loam about 18 inches thick. The upper subsoil is brown heavy clay loam about 21 inches thick. The lower subsoil is brown sandy clay loam about 18 inches thick. The substratum is stratified sandy, gravelly, or cobbly alluvium of granitic origin.

The Placentia soils are near the Hanford, Greenfield, and Ramona soils.

Placentia soils are used for dryland pasture and grain, for irrigated permanent pasture, and for nonfarm purposes.

Placentia fine sandy loam, 0 to 5 percent slopes (PlB).—This nearly level to gently sloping soil occurs on terraces and alluvial fans.

Following is a typical profile on a west-facing slope of 4 percent (about 1,200 feet north-northwest of the intersection of State Highway 71 and U.S. Highway 395, on the west side of right-of-way, near the northeast corner of section 13, T. 8 S., R. 3 W.):

A11—0 to 8 inches, brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) when moist; weak, medium, granular structure; slightly hard, very friable, nonsticky and nonplastic; abundant very fine roots; many, very fine, tubular pores; medium acid (pH 6.0); clear, smooth boundary. Horizon is 5 to 10 inches thick.

A12—8 to 13 inches, brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) when moist; weak, medium, subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; plentiful, fine, tubular pores; medium acid (pH 6.0); clear, smooth boundary. Horizon is 5 to 18 inches thick.

A13—13 to 18 inches, pale-brown (10YR 6/3) loam, dark brown (10YR 4/3) when moist; weak, medium, subangular blocky structure; hard, friable, slightly sticky and nonplastic; plentiful fine roots; many, fine and very fine, tubular pores; slightly acid (pH 6.2); abrupt, smooth boundary. Horizon is 2 to 5 inches thick.

B21t—18 to 31 inches, brown (7.5YR 4/4) heavy clay loam, dark brown (7.5YR 3/2) when moist; strong, coarse, prismatic structure; extremely hard, very firm, sticky and very plastic; few fine roots, mostly in interfaces between peds; very few, fine, tubular pores; continuous thick clay films on ped faces; mildly alkaline (pH 7.5); clear, smooth boundary. Horizon is 6 to 14 inches thick.

B22t—31 to 39 inches, brown (7.5YR 5/4) heavy clay loam, dark brown (7.5YR 3/2) when moist; strong, coarse, prismatic structure; very hard, very firm, sticky and plastic; very few fine roots; very few, fine, tubular pores; many moderately thick clay films on ped faces; strongly effervescent; moderately alkaline (pH 8.0), with both disseminated and segregated lime in soft masses; clear, smooth boundary. Horizon is 7 to 14 inches thick.

B3—39 to 57 inches, brown (10YR 5/3) sandy clay loam, dark reddish brown (5YR 3/2) when moist; massive; hard, firm, sticky and plastic; strongly effervescent; moderately alkaline (pH 8.0); clear, smooth boundary. Horizon is 5 to 15 inches thick.

C—57 inches, stratified sandy, gravelly, or cobbly granitic alluvium.

The A horizon is medium acid to slightly acid in reaction, brown to grayish brown or pale brown in color, and sandy loam to loam in texture. The Bt horizon is neutral to moderately alkaline and contains lime splotches in the lower part. It is brown to reddish brown to dark red or yellowish brown in color and heavy clay loam to sandy clay in texture. The C horizon is stratified sandy, gravelly, or cobbly granitic alluvium. Depth to the dense, very slowly permeable clay commonly ranges from 12 to 20 inches.

Included with this soil in mapping are small areas of Hanford coarse sandy loam, Greenfield sandy loam, and Ramona sandy loam. Some small areas with a noncalcareous lower Bt horizon and substratum are also included. Some inclusions are 20 to 36 inches deep to clay. Included also are small areas having slopes of 5 to 25 percent.

Permeability of this soil is very slow. Runoff is medium, and the hazard of erosion is moderate. The available water holding capacity is 3.0 to 4.5 inches. The root zone is 12 to 20 inches deep. Natural fertility is moderate.

This Placentia soil is used for permanent pasture, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IVe–3 (19) irrigated; Claypan range site)

Placentia fine sandy loam, 5 to 15 percent slopes (PlD).—A few small areas having slopes of 0 to 5 percent or of 15 to 25 percent are included in areas mapped as this soil.

The available water holding capacity of this soil is 3.0 to 4.5 inches. Runoff is medium, and the hazard of erosion is moderate. Natural fertility is low.

This soil is used for dryland grain and pasture and for nonfarm purposes. (Capability unit IVe–3 (19) irrigated; Claypan range site)

Placentia cobbly fine sandy loam, 8 to 25 percent slopes (PmE).—The profile of this soil is similar to that described for the Placentia series, but it has a cobbly fine sandy loam surface layer.

The available water holding capacity of this soil is 2.0 to 3.0 inches. Natural fertility is low. Runoff is rapid, and the hazard of erosion is high.

This soil is used for dryland pasture and range and for nonfarm purposes. (Capability unit VIe–7 (19) dryland; Claypan range site)

Porterville Series

In the Porterville series are well-drained soils on alluvial fans. Slopes range from 0 to 15 percent. These soils developed in alluvium consisting mainly of very fine basic igneous materials. Elevations range from 1,000 to 2,700 feet. The average annual rainfall ranges from 10 to 14 inches, the average annual temperature from 61° to 64° F., and the average frost-free season from 230 to 280 days. Vegetation is chiefly annual grasses, forbs, salvia, and buckwheat.

In a typical profile, the surface layer is brown cobbly clay and clay about 15 inches thick. The next layer is reddish-brown clay about 10 inches thick. Underlying this, to a depth of several feet, is brown and yellowish-red clay.

The Porterville series are near the Cajalco, Yokohl, Las Posas, and Vallecitos soils.

Porterville soils are used for dryland grain, pasture, and range and for irrigated citrus, alfalfa, and truck crops. Small areas are used for homesites and other nonfarm purposes.

Porterville cobbly clay, 2 to 15 percent slopes (PrD).—This gently sloping to strongly sloping soil occurs on alluvial fans.

Following is a typical profile on a west-facing slope of 5 percent (1,600 feet west and 800 feet south of the northwest corner of section 19, T. 4 S., R. 5 W.):

A11—0 to 7 inches, brown (7.5YR 4/2) cobbly clay, dark brown (7.5YR 3/2) when moist; moderate, medium and coarse, angular blocky structure (the surface half-inch has strong, very fine, subangular blocky structure); very hard, firm, sticky and plastic; abundant very fine roots; many, very fine, irregular and few, tubular pores; 20 to 25 percent of the surface is covered with partly embedded rounded cobblestones; neutral (pH 6.8); gradual, smooth boundary. Horizon is 3 to 12 inches thick.

A12—7 to 15 inches, brown (7.5YR 4/2) clay, dark brown (7.5YR 4/2) when moist; moderate, coarse, angular blocky structure; extremely hard, very firm, sticky and very plastic; abundant very fine roots; few, very fine, irregular and tubular pores; common slickensides; moderately alkaline (pH 8.0); slightly effervescent; lime in small concretions; gradual, smooth boundary. Horizon is 4 to 15 inches thick.

AC—15 to 25 inches, reddish-brown (5YR 5/4) clay, dark reddish brown (5YR 3/4) when moist; moderate, coarse, angular blocky structure; extremely hard, very firm, sticky and very plastic; few very fine roots; many slickensides; moderately alkaline (pH 8.0); slightly effervescent; lime in small concretions; clear, smooth boundary. Horizon is 6 to 12 inches thick.

C1—25 to 50 inches, brown (7.5YR 5/4) clay, yellowish red (5YR 4/6) when moist; moderate, coarse, angular blocky structure; extremely hard, very firm, sticky and very plastic; very few very fine roots: few slickensides; moderately alkaline (pH 8.0); gradual, smooth boundary. Horizon is 4 to 25 inches thick.

C2—50 to 66 inches, yellowish-red (5YR 5/6) clay, yellowish red (5YR 4/6) when moist; moderate, coarse, angular blocky structure; extremely hard, very firm, sticky and plastic; few slickensides; mildly alkaline (pH 7.5).

The A horizon is neutral to moderately alkaline in reaction and grayish brown, brown, or dark reddish brown in color. The AC horizon is intermittently slightly effervescent. It is grayish brown to brown to reddish brown. The C horizon is brown, dark reddish brown, dark yellowish brown, or yellowish red.

Included with this soil in mapping are small areas of Cajalco fine sandy loam, Las Posas loam, and Yokohl loam. Some small areas of Porterville gravelly clay are included. Areas having slopes of 15 to 25 percent are also included.

This Porterville soil has slow permeability and medium runoff. The hazard of erosion is slight. The available water holding capacity is 7.0 to 10.0 inches. The root zone is more than 60 inches deep. Natural fertility is moderate.

This soil is used for irrigated citrus, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IVe–5 (19) irrigated; Clayey range site)

Porterville clay, 0 to 8 percent slopes (PoC).—The profile of this soil is similar to that described for the Porterville series, but it has a dark reddish-brown clay surface layer.

Included with this soil in mapping are small areas on slopes of 8 to 15 percent. A small acreage of moderately saline-alkali soil and a very small area with a gravelly or cobbly surface layer are also included.

The available water holding capacity of this soil is 7.0 to 10.0 inches. Runoff is slow, and the hazard of erosion is slight.

This soil is used for dryland grain and pasture, for irrigated citrus, and for nonfarm purposes. (Capability unit IIe–5 (19) irrigated; Clayey range site)

Porterville clay, moderately deep, 2 to 8 percent slopes (PsC).—The profile of this soil is similar to that described for the Porterville series, but it has a reddish-brown clay surface layer. Unrelated, weakly consolidated sediment or metamorphosed sandstone is at depth of 24 to 42 inches.

Included with this soil in mapping are small areas having slopes of 0 to 2 percent or of 8 to 15 percent. Also included are small areas of clay that are deep (42 to 54 inches), and other small areas that are shallow (15 to 24 inches), to the unrelated underlying materials.

The available water holding capacity of this soil is 4.5

to 7.5 inches. Runoff is medium, and the hazard of erosion is moderate.

This soil is used for irrigated citrus and for dryland grain and pasture. Small areas are used for nonfarm purposes. (Capability unit IIIe–5 (19) irrigated; Clayey range site)

Porterville clay, moderately deep, slightly saline-alkali, 0 to 5 percent slopes (PtB).—The profile of this soil is similar to that described for the Porterville series, but it has a dark grayish-brown to brown clay surface layer. It is 24 to 42 inches deep over calcareous marl and is saline-alkali.

Included with this soil in mapping are some small areas that are not saline-alkali.

The available water holding capacity of this soil is 4.5 to 7.5 inches. Runoff is slow, and the hazard of erosion is slight. Natural fertility is moderate.

This soil is used for irrigated alfalfa, permanent pasture, and truck crops, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IIIe–5 (19) irrigated; Clayey range site)

Porterville gravelly clay, moderately deep, 2 to 15 percent slopes, eroded (PvD2).—The profile of this soil is similar to that described for the Porterville series, but it has a gray gravelly clay surface layer that grades to grayish-brown clay. At a depth of 24 to 42 inches is calcareous marl or granodiorite.

Included with this soil in mapping are small areas that are only 15 to 24 inches deep to the substratum. Some included areas of nongravelly clay are 24 to 42 inches deep over marl and have slopes of 8 to 15 percent.

The available water holding capacity of this soil is 3.5 to 6.0 inches. The hazard of erosion is moderate, and runoff is medium.

This soil is used mainly for dryland grain and pasture. The less sloping areas are used for irrigated truck crops, alfalfa, and permanent pasture. Small areas are also used for nonfarm purposes. (Capability unit IVe–5 (19) irrigated; Clayey range site)

Ramona Series

The Ramona series consists of well-drained soils on alluvial fans and terraces. Slopes range from 0 to 25 percent. These soils developed in alluvium consisting mainly of granitic materials. Elevations range from 500 to 3,500 feet. The average annual rainfall ranges from 9 to 18 inches, the average annual temperature from 59° to 65° F., and the average frost-free season from 220 to 300 days. The vegetation consists chiefly of annual grasses, forbs, chamise, salvia, and flat-top buckwheat.

In a typical profile, the surface layer is brown sandy loam and fine sandy loam about 23 inches thick. The subsoil extends to a depth of about 68 inches. This layer is brown loam and reddish-brown and yellowish-red sandy clay loam. The substratum is strong-brown fine sandy loam.

The Ramona soils are near the Tujunga, Hanford, Greenfield, Arlington, Buren, Placentia, and Monserate soils.

The Ramona soils are used for dryland grain and pasture and for irrigated peaches, apricots, citrus, alfalfa, truck crops, and grain. They are also used as sites for homes and schools and for other nonfarm purposes.

Ramona sandy loam, 2 to 5 percent slopes, eroded (RaB2).—This soil occurs on alluvial fans and terraces.

Following is a typical profile on a west-facing slope of 3 percent (1,100 feet north and 500 feet west of the south corner of section 31, T. 2 S., R. 1 W.):

Ap—0 to 14 inches, brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) when moist; massive; hard, very friable, nonsticky and nonplastic; few fine roots; many, very fine, irregular and tubular pores; medium acid (pH 6.0); clear, smooth boundary. Horizon is 8 to 15 inches thick.

A1—14 to 23 inches, brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) when moist; massive; hard, very friable, slightly sticky and slightly plastic; few fine roots; common, fine, tubular pores; slightly acid (pH 6.5); clear, smooth boundary. Horizon is 5 to 10 inches thick.

B1—23 to 29 inches, brown (7.5YR 5/4) loam, dark reddish brown (5YR 3/4) when moist; moderate, coarse, angular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; many, fine, tubular pores; few thin clay films on ped faces and in pores; slightly acid (pH 6.5); clear, smooth boundary. Horizon is 3 to 8 inches thick.

B21t—29 to 37 inches, reddish-brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) when moist; moderate, coarse, prismatic structure; very hard, firm, sticky and plastic; few fine roots; common, fine, tubular pores; common thin clay films on ped faces and in pores; slightly acid (pH 6.5); gradual, smooth boundary. Horizon is 6 to 10 inches thick.

B22t—37 to 46 inches, yellowish-red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) when moist; moderate, coarse, prismatic structure; very hard, firm, sticky and plastic; few fine roots; few, fine, tubular pores; many moderately thick clay films on ped faces and in pores; slightly acid (pH 6.5); gradual, smooth boundary. Horizon is 6 to 12 inches thick.

B23t—46 to 58 inches, yellowish-red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) when moist; moderate, coarse, prismatic structure; very hard, firm, sticky and plastic; few, fine, tubular pores; many moderately thick clay films on ped faces and in pores; slightly acid (pH 6.5); gradual, smooth boundary. Horizon is 8 to 14 inches thick.

B3—58 to 68 inches, yellowish-red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) when moist; moderate, coarse, angular blocky structure; very hard, firm, sticky and plastic; few, fine, tubular pores; many moderately thick clay films on ped faces and in pores; neutral (pH 6.8); clear, irregular boundary. Horizon is 6 to 12 inches thick.

C—68 to 74 inches, strong-brown (7.5YR 5/6) fine sandy loam, brown to dark brown (7.5YR 4/4) when moist; massive; hard, firm, slightly sticky and slightly plastic; few, fine, tubular pores; neutral (pH 7.0).

The A horizon ranges from neutral to medium acid in reaction, from grayish brown or brown to dark brown in color, and from sandy loam to fine sandy loam in texture. The Bt horizon generally is slightly acid to moderately alkaline, and in places it is slightly effervescent in the lower part. This horizon ranges from yellowish red to reddish brown or dark brown in color and from sandy clay loam to heavy fine sandy loam in texture. The C horizon ranges from slightly acid to moderately alkaline, from strong brown or brown to yellowish brown, and from loamy sand to fine sandy loam.

Included with this soil in mapping are small areas of Tujunga loamy sand, Hanford coarse sandy loam, Greenfield sandy loam, Arlington fine sandy loam, Placentia fine sandy loam, and Monserate sandy loam. Also included are some small areas that have a loamy sand or gravelly sandy loam surface layer.

Permeability of this soil is moderately slow, and available water holding capacity is 8.5 to 9.5 inches. Runoff is medium,

and the hazard of erosion is moderate. The root zone is more than 60 inches deep, and natural fertility is high.

This Ramona soil is used for irrigated peaches, apricots, citrus, and grain and for dryland grain and pasture. It is suited to many nonfarm uses. (Capability unit IIe-1 (19) irrigated; Loamy range site)

Ramona sandy loam, 0 to 2 percent slopes (RaA).—Included with this soil in mapping are a few small areas that have a loamy sand surface layer. Runoff is slow on this soil, and the hazard of erosion is slight.

This soil is used for irrigated citrus, truck crops, and alfalfa, for dryland grain and pasture, and for homesites. (Capability unit I-1 (19) irrigated; Loamy range site)

Ramona sandy loam, 0 to 5 percent slopes, severely eroded (RaB3).—The profile of this soil is similar to that described for the Ramona series, but its surface layer is 6 to 10 inches thick. Included with this soil in mapping are a few small areas that have a loamy sand surface layer.

Runoff is medium on this soil, and the hazard of erosion is moderate. Natural fertility is moderate.

This soil is used for irrigated citrus, alfalfa, and truck crops, for dryland grain and pasture, and for homesites. (Capability unit IIIe-1 (19) irrigated; Loamy range site)

Ramona sandy loam, 5 to 8 percent slopes, eroded (RaC2).—Included with this soil in mapping are a few small areas that have a loamy sand surface layer. Runoff is medium on this soil, and the hazard of erosion is moderate.

This soil is used for irrigated citrus, peaches, truck crops, alfalfa, and grain, for dryland grain and pasture, and for homesites. (Capability unit IIIe-1 (19) irrigated; Loamy range site)

Ramona sandy loam, 5 to 8 percent slopes, severely eroded (RaC3).—This soil has a thinner surface layer, but its profile is otherwise similar to that described for the Ramona series. The surface layer is 6 to 10 inches thick.

Included with this soil in mapping are small areas that have a gravelly sandy loam surface layer. Also included are small areas that have a substratum of loamy sand.

The natural fertility of this soil is moderate. Runoff is medium to rapid, and the hazard of erosion is high.

This soil is used for irrigated citrus, peaches, truck crops, alfalfa, and grain and for dryland grain and pasture. It is suited to homesites. (Capability unit IIIe-1 (19) irrigated; Loamy range site)

Ramona sandy loam, 8 to 15 percent slopes, eroded (RaD2).—Included with this soil in mapping are a few small areas that have a loamy sand surface layer.

The natural fertility of this soil is moderate. Runoff is rapid, and the hazard of erosion is high.

This soil is used for irrigated citrus and peaches, for dryland grain and pasture, and for homesites. (Capability unit IVe-1 (19) irrigated; Loamy range site)

Ramona sandy loam, 8 to 15 percent slopes, severely eroded (RaD3).—The profile of this soil is similar to that described for the Ramona series, but it has a surface layer that is 6 to 10 inches thick.

Included with this soil in mapping are small areas that have a fine sandy loam, gravelly fine sandy loam, or gravelly sandy loam surface layer.

Runoff is rapid on this soil, and the hazard of erosion is high. Natural fertility is moderate.

This soil is used for irrigated citrus and peaches, dryland grain and pasture, and for homesites. (Capability unit IVe-1 (19) irrigated; Loamy range site)

Ramona sandy loam, 15 to 25 percent slopes, severely eroded (RaE3).—The profile of this soil is similar to that described for the Ramona series, but its surface layer is only 6 to 10 inches thick.

Included with this soil in mapping are small areas that have a gravelly fine sandy loam or fine sandy loam surface layer. Also included are a few areas that are only moderately eroded.

The natural fertility of this soil is moderate. Runoff is rapid, and the hazard of erosion is high.

This soil is used for dryland grain and pasture, for irrigated peaches and citrus, and for homesites. (Capability unit VIe-1 (19) dryland; Loamy range site)

Ramona sandy loam, moderately deep, 8 to 15 percent slopes, eroded (RdD2).—The profile of this soil is similar to that described for the Ramona series, but it has a dark-brown to brown surface layer and is underlain at a depth of 24 to 40 inches by unrelated calcareous sediment.

Included with this soil in mapping are small areas that have a gravelly sandy loam or fine sandy surface layer.

The available water holding capacity of this soil is 4.0 to 6.0 inches. Runoff is medium, and the hazard of erosion is moderate.

This soil is used for dryland grain and pasture. (Capability unit IVe-1 (19) irrigated; Loamy range site)

Ramona sandy loam, moderately deep, 15 to 25 percent slopes, severely eroded (RdE3).—The profile of this soil is similar to that described for the Ramona series, but it has a dark-brown to brown surface layer. At a depth of 15 to 36 inches is unrelated calcareous sediment.

Included with this soil in mapping are small areas that are less than 15 inches deep to unrelated sediment. Also included are some areas with a fine sandy loam surface layer.

The water holding capacity of this soil is 3.0 to 5.0 inches. Natural fertility is moderate. Runoff is rapid, and the hazard of erosion is high.

This soil is used for range, limited dryland grain and pasture, and for homesites. (Capability unit VIe-1 (19) dryland; Loamy range site)

Ramona very fine sandy loam, 0 to 8 percent slopes, eroded (ReC2).—The profile of this soil is similar to that described for the Ramona series, but it has a dark-brown very fine sandy loam surface layer.

Included with this soil in mapping are a few small severely eroded areas.

The available water holding capactiy of this soil is 9.5 to 10.5 inches. Runoff is medium, and the hazard of erosion is moderate.

This soil is used for irrigated citrus, peaches, truck crops, alfalfa, and grain, for dryland grain and pasture, and for homesites. (Capability unit IIIe-1 (19) irrigated; Loamy range site)

Ramona very fine sandy loam, moderately deep, 0 to 8 percent slopes, eroded (RfC2).—The profile of this soil is similar to that described for the Ramona series, but it has a dark-brown very fine sandy loam surface layer. At a depth of 24 to 42 inches is unrelated calcareous sediment of the San Timoteo formation.

Included with this soil in mapping are small areas of

Greenfield sandy loam. Also included are a few areas that are only 15 to 25 inches deep to unrelated sediment.

The available water holding capacity of this soil is 5.0 to 8.0 inches. Runoff is medium, and the hazard of erosion is moderate. Natural fertility is moderate.

This soil is used for dryland grain and pasture and for homesites. (Capability unit IIIe–1 (19) irrigated; Loamy range site)

Ramona and Buren loams, 5 to 15 percent slopes, eroded (RnD2).—This is an undifferentiated group of soils on convex, rolling, dissected terraces. About 50 percent of the acreage is Ramona loam; 35 percent, Buren loam; and the remaining 15 percent, included areas of severely eroded Ramona and Buren soils, as well as Hanford soils in the drainageways.

The Ramona soil in this mapping unit is similar to Ramona sandy loam, 2 to 5 percent slopes, eroded, but it has a loam surface layer 4 to 10 inches thick. The available water holding capacity of this soil is 8.5 to 10.0 inches. Runoff is medium, and the hazard of erosion is moderate. The root zone is more than 60 inches deep.

The Buren soil is similar to Buren fine sandy loam, 2 to 8 percent slopes, eroded, but its surface layer is loam 4 to 10 inches thick. Its available water holding capacity is 3.0 to 8.0 inches. Runoff is medium, and the erosion hazard is moderate. The effective root zone is 18 to 36 inches deep.

Soils of this unit are used for dryland grain and, where the climate is favorable, for irrigated citrus. (Both soils, capability unit IVe–8 (19) irrigated; Loamy range site)

Ramona and Buren loams, 5 to 25 percent slopes, severely eroded (RnE3).—These soils are on convex, dissected terraces. Ramona loam makes up about 55 percent of the total acreage, and Buren loam, about 35 percent. The remaining 10 percent consists of included small areas of less eroded Ramona and Buren soils, and of Hanford soils in the drainageways.

The Ramona soil is similar to Ramona sandy loam, 2 to 5 percent slopes, eroded, except that most or all of its original surface layer has been washed away. This layer is as much as 8 inches thick in some places, but in other places it is thinner or is missing entirely. On 30 to 60 percent of the areas mapped as this unit, all of the original surface layer is gone and the subsoil is exposed. The available water holding capacity of this Ramona soil is 8.5 to 10.0 inches. Runoff is rapid, and the erosion hazard is high. The root zone is more than 60 inches deep.

The Buren soil is similar to Buren fine sandy loam, 2 to 8 percent slopes, eroded, but its original surface layer of loam has been so affected by erosion that it is only 8 inches thick or less. On 30 to 60 percent of the areas, all of the original surface layer has been eroded away and the subsoil is exposed. The available water holding capacity of the Buren soil is 2.0 to 3.0 inches. Runoff is rapid, and the hazard of erosion is high. The effective root zone is 12 to 36 inches deep.

These soils are used for dryland pasture and, in areas of favorable climate, for irrigated citrus. (Ramona soil, capability unit VIe–1 (19) dryland; Loamy range site. Buren soil, capability unit VIe–8 (19) dryland; Shallow Loamy range site)

Ramona and Buren sandy loams, 15 to 25 percent slopes, severely eroded (RmE3).—These soils occupy convex, dissected, old terraces. About 45 percent of the total acreage is Ramona sandy loam; about 40 percent is Buren sandy loam; and the rest is included areas of less eroded Ramona and Buren soils having a sandy loam surface layer 10 to 16 inches thick, as well as small areas of Hanford soils in the drainageways.

The Ramona soil is similar to Ramona sandy loam, 2 to 5 percent slopes, eroded, except that the original surface layer is only 10 inches thick or less, the soil is cut by many gullies, and there are areas of exposed subsoil. The available water holding capacity is 7.5 to 9.5 inches. Runoff is rapid, and the erosion hazard is high. The root zone is more than 60 inches deep.

The Buren soil is similar to Buren fine sandy loam, 2 to 8 percent slopes, but its original surface layer is 10 inches thick or less and in places is missing entirely. Many gullies have been formed, and the subsoil is exposed in some places. The available water holding capacity is 2.0 to 3.0 inches. Runoff is rapid, and the hazard of erosion is high. The effective root zone is 12 to 36 inches deep.

The soils in this unit are used for dryland pasture and, where the climate is favorable, for irrigated citrus. (Ramona soil, capability unit VIe–1 (19) dryland; Loamy range site. Buren soil, capability unit VIe–8 (19) dryland; Loamy range site)

Riverwash (RsC) is on slopes of 0 to 8 percent in valley fills and on alluvial fans. These sandy, gravelly, or cobbly areas lie in the beds of the major streams and larger creeks. This alluvial material is generally light gray, very pale brown to grayish brown, or brown in color. Its depth is variable but is generally 20 inches to 60 inches or more. Areas in the streambed are frequently flooded during the rainy season. Drainage is variable.

This land type has no value for farming and little value for grazing. Vegetation is annual grasses, forbs, shrubs, low willows, and a few cottonwood trees. Where the land is near tilled fields, it provides habitat for small game, such as rabbits, doves, and quail. (Capability unit VIIIw–4 (19, 20) dryland; range site not assigned)

Rock land (RtF) has granite boulders and rock outcrops that cover 35 to 60 percent or more of the surface. In the small areas between the outcrops and boulders is light grayish-brown to grayish-brown, slightly acid to medium acid loamy sand to sandy loam. Slopes range from 15 to 75 percent.

This land type provides limited forage for wildlife from annual grasses and forbs. This land is used for a wildlife habitat and as a source of water. (Capability unit VIIIs–1 (19, 20) dryland; range site not assigned)

Rough broken land (RuF) consists of alluvial materials that are remnants of old alluvial fans and terraces. These fans and terraces have been dissected by drainages to such an extent that areas of recognizable soils cannot be mapped. Slopes range from 30 to 50 percent.

The materials in this land type are mainly from acid igneous rocks, such as granite, granodiorite, gneiss, and mica-schist. They are slightly acid to moderately alkaline, pale brown or grayish brown to brown or dark grayish brown; and intermittently effervescent.

The vegetation is annual grasses and forbs. These plants produce some forage for wildlife. Where the land is near tilled fields, it provides habitat for small game, particularly rabbits, doves, and quail. The main uses of this land are for wildlife habitat and watershed. (Capa-

bility unit VIIIe-1 (19, 20)dryland; range site not assigned)

San Emigdio Series

In the San Emigdio series are well-drained soils on alluvial fans. Slopes range from 0 to 15 percent. These soils developed in alluvium from weakly consolidated sedimentary formations. Elevations range from 600 to 1,800 feet. The average annual rainfall ranges from 12 to 18 inches, the average annual temperature from 61° to 64° F., and the average frost-free season from 220 to 280 days. The vegetation consists chiefly of annual grasses, forbs, and chamise.

In a typical profile, the surface layer is light brownish-gray fine sandy loam about 8 inches thick. The next layer, of similar color and texture, is about 14 inches thick. Underlying this and extending to a depth of more than 60 inches is light-gray fine sandy loam.

The San Emigdio soils are near the Metz and San Timoteo soils.

The San Emigdio soils are used for dryland grain and pasture and for irrigated citrus, walnuts, alfalfa, apricots, and truck crops. They are also used as sites for homes and schools and for other nonfarm purposes.

San Emigdio fine sandy loam, 2 to 8 percent slopes, eroded (SeC2).—This gently to moderately sloping soil occurs on alluvial fans.

Following is a typical profile on a west-facing slope of 5 percent (800 feet east and 50 feet south of the northwest corner of section 16, T. 3 S., R. 2 W.) :

Ap—0 to 8 inches, light brownish-gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) when moist; weak, medium and fine, crumb structure; hard, very friable, nonsticky and nonplastic; abundant very fine roots; many, fine, tubular pores; moderately alkaline (pH 8.2) ; slightly effervescent; abrupt, smooth boundary. Horizon is 3 to 8 inches thick.

C1—8 to 22 inches, light brownish-gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) when moist; massive; hard, very friable, nonsticky and nonplastic; plentiful fine roots; many, fine, tubular pores; moderately alkaline (pH 8.2) ; strongly effervescent; lime disseminated and in filaments; clear, smooth boundary. Horizon is 6 to 15 inches thick.

C2—22 to 42 inches, light-gray (2.5Y 7/2) fine sandy loam, grayish brown to light olive brown (2.5Y 5/3) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; many, fine, tubular pores; moderately alkaline (pH 8.2) ; strongly effervescent; lime disseminated and in filaments; clear, smooth boundary. Horizon is 12 to 24 inches thick.

C3—42 to 60 inches, light-gray (2.5Y 7/2) fine sandy loam, grayish brown to light olive brown (2.5Y 5/3) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; very few fine roots; many, fine, tubular pores; moderately alkaline (pH 8.2) ; strongly effervescent; lime disseminated and in filaments.

The A horizon ranges from mildly alkaline to moderately alkaline in reaction, from light gray to grayish brown to pale brown and light brownish gray in color, and from loamy fine sand to fine sandy loam in texture. The C horizon ranges from slightly to strongly effervescent, from light brownish gray, light gray, or gray to grayish brown or pale brown, and from sandy loam to fine sandy loam and loam. The A and C horizons contain 12 to 18 percent clay. The lower C horizon is gravelly fine sandy loam, fine sandy loam, fine sand, or silt loam, but it contains lenses of silt.

Included with this soil in mapping are small areas of Metz loamy fine sand. Some small areas of severely eroded soils and San Emigdio soils having slopes of 8 to 15 percent are also included.

Permeability of this soil is moderately rapid. The available water holding capacity is 7.5 to 9.0 inches. Runoff is medium, and the hazard of erosion is moderate. The root zone is 60 inches deep or more, and natural fertility is moderate.

This San Emigdio soil is used for irrigated citrus, alfalfa, and truck crops, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IIe-1 (19) irrigated; Loamy range site)

San Emigdio fine sandy loam, 0 to 2 percent slopes (SeA).—Included with this soil in mapping are a few small eroded areas that have a loamy sand substratum at a depth of 24 to 42 inches. Also included are areas having slopes of 2 to 5 percent.

Runoff is very slow on this soil, and the hazard of erosion is slight.

This soil is used for irrigated citrus, truck crops, apricots, and alfalfa, for dryland grain and pasture, and for homesites. (Capability unit I-1 (19) irrigated; Loamy range site)

San Emigdio fine sandy loam, 8 to 15 percent slopes, eroded (SeD2).—The profile of this soil is similar to that described for the San Emigdio series, but it has a brown surface layer. A few small areas on slopes of 15 to 35 percent are included with this soil in mapping.

Runoff is medium on this soil, and the hazard of erosion is moderate.

This soil is used for irrigated citrus and alfalfa, for dryland grain and pasture, and for homesites. (Capability unit IIIe-1 (19) irrigated; Loamy range site)

San Emigdio fine sandy loam, deep, 0 to 2 percent slopes (SfA).—The profile of this soil is similar to that described for the San Emigdio series, but it is loamy sand at a depth of 36 to 48 inches. Small eroded areas are included with this soil in mapping.

Runoff is very slow on this soil, and the hazard of erosion is slight. The available water holding capacity is 5.0 to 6.5 inches.

This soil is used for irrigated alfalfa, apricots, and truck crops, for dryland grain and pasture, and for homesites. (Capability unit IIs-4 (19) irrigated; Loamy range site)

San Emigdio loam, 0 to 2 percent slopes (SgA).—The profile of this soil is similar to that described for the San Emigdio series, but it has a brown surface layer and a loam texture throughout.

Included with this soil in mapping is an area having a sandy loam substratum at a depth of 20 to 36 inches. A few inclusions have a silty clay loam substratum. Some soils that are slightly saline-alkali on basin rims are also included.

Permeability of this soil is moderate, and the available water holding capacity is 8.5 to 10.0 inches. Runoff is slow, and the hazard of erosion is slight. Natural fertility is high.

This soil is used for irrigated alfalfa and truck crops, for dryland pasture and grain, and for homesites. (Capability unit I-1 (19) irrigated; Loamy range site)

San Emigdio loam, 2 to 8 percent slopes (SgC).—The profile of this soil is similar to that described for the San Emigdio series, but it has a loam texture throughout.

An area that has a sandy loam substratum at a depth

of 20 to 36 inches is included with this soil in mapping. Also included are a few small areas having a sandy loam substratum at a depth of 10 to 20 inches and gravelly coarse sand at depths of 30 to 42 inches.

Permeability of this soil is moderate. The available water holding capacity is 8.5 to 10.0 inches. Runoff is medium, and the hazard of erosion is moderate. Natural fertility is high.

This soil is used for irrigated citrus, walnuts, alfalfa, and truck crops and for dryland grain and pasture. (Capability unit IIe–1 (19) irrigated; Loamy range site)

San Emigdio loam, 8 to 15 percent slopes, eroded (SgD2).—This soil is light brownish-gray loam throughout the profile; otherwise it is similar to the San Emigdio soil described as typical for the series.

Included with this soil in mapping are a few small areas of cobbly loam. Also included are some areas with stream channel erosion and some areas having slopes of 15 to 25 percent.

Permeability of this soil is moderate, and the available water holding capacity is 8.5 to 10.0 inches. Runoff is medium, and the hazard of erosion is moderate. Natural fertility is high.

This soil is used for irrigated citrus, alfalfa, and truck crops, for dryland grain and pasture, and for homesites. (Capability unit IIIe–1 (19) irrigated; Loamy range site)

San Emigdio sandy loam, channeled, 2 to 15 percent slopes (SdD).—The profile of this soil is similar to that described for the San Emigdio series, but it has a sandy loam surface layer. This channeled soil is subject to stream erosion and deposition. Small areas that have slopes of 15 to 35 percent are included.

Runoff is medium on this soil, and the hazard of erosion is moderate.

This soil is used for range and for nonfarm purposes. (Capability unit VIIw–4 (19) dryland; Sandy Alluvial range site)

San Timoteo Series

In the San Timoteo series are well-drained soils on dissected uplands. Slopes range from 8 to 50 percent. These soils developed on calcareous marine sediment and weak sandstone. Elevations range from 1,200 to 2,500 feet. The average annual rainfall ranges from 12 to 15 inches, the average annual temperature from 60° to 64° F., and the average frost-free season from 220 to 250 days. The vegetation is chiefly annual grasses, forbs, chamise, and sumac.

In a typical profile, the surface layer is pale-brown and light-gray loam about 14 inches thick. The next layer is light-gray loam. At a depth of about 22 inches is light-gray, decomposing, soft sandstone.

The San Timoteo soils are near the Metz and San Emigdio soils.

San Timoteo soils are used for dryland grain and pasture and as a source of water.

San Timoteo loam, 8 to 25 percent slopes, eroded (SmE2).—This rolling to hilly soil occurs on dissected marine deposits.

Following is a typical profile on a southeast-facing slope of 15 percent (900 feet north and 500 feet east of the southwest corner of section 13, T. 2 S., R. 3 W.):

O1—⅛ inch to 0, dark-brown, partly decomposed litter from low shrubs.

A11—0 to 9 inches, pale-brown (10YR 6/3) loam, brown (10YR 5/3) when moist; weak, fine, granular structure; soft, friable, nonsticky and slightly plastic; abundant fine and medium roots; moderately alkaline (pH 8.2); violently effervescent; clear, smooth boundary. Horizon is 6 to 9 inches thick.

A12—9 to 14 inches, light-gray (10YR 7/2) loam, pale brown (10YR 6/3) when moist; massive; soft, friable, nonsticky and slightly plastic; few medium and coarse roots; moderately alkaline (pH 8.2); violently effervescent; gradual, smooth boundary. Horizon is 5 to 11 inches thick.

AC—14 to 22 inches, light-gray (10YR 7/2) loam, grayish brown (10YR 5/2) when moist; massive; soft, friable, nonsticky and slightly plastic; few medium and coarse roots; moderately alkaline (pH 8.2); violently effervescent; clear, irregular boundary. Horizon is 8 to 10 inches thick.

C—22 to 28 inches, light-gray (10YR 7/2) decomposing soft sandstone breaking down to sandy loam, pale brown (10YR 6/3) when moist; massive; hard, firm, nonsticky and nonplastic; few, medium and coarse, random roots; moderately alkaline (pH 8.2); violently effervescent.

The A horizon is moderately alkaline to neutral and slightly to violently effervescent. It is light yellowish brown and pale brown to light gray and light brownish gray in color and fine sandy loam to silt loam in texture. The AC horizon is light-gray to gray fine sandy loam to silt loam.

Included with this soil in mapping are small areas of Metz loamy sand, San Emigdio sandy loam, and Rough broken land. A few areas having a gravelly fine sandy loam or very fine sandy loam surface layer are also included. Other inclusions are an unnamed soil that is 10 to 20 inches deep to sandstone, and San Timoteo soils having slopes of 2 to 8 percent or of 25 to 35 percent.

Permeability of this soil is moderate, and the available water holding capacity is 3.0 to 5.0 inches. Runoff is medium, and the hazard of erosion is moderate. The root zone is 20 to 30 inches deep. Natural fertility is moderate.

This San Timoteo soil is used for dryland pasture and grain. (Capability unit IVe–1 (19) irrigated; Loamy range site)

San Timoteo loam, 25 to 50 percent slopes, eroded (SmF2).—Included with this soil in mapping are some severely eroded areas. Runoff is rapid on this soil, and the hazard of erosion is high. Natural fertility is very low.

This soil is used for range and as a source of water. (Capability unit VIe–1 (19) dryland; Loamy range site)

Sheephead Series

The Sheephead series consists of somewhat excessively drained soils that developed on mica-schist and gneiss. These soils occupy uplands, where slopes range from 8 to 75 percent. Elevations range from 3,500 to 7,500 feet. The average annual rainfall ranges from 10 to 25 inches, the average annual temperature from 50° to 56° F., and the average frost-free season from 150 to 225 days. Vegetation is chiefly annual grasses, pine bluegrass, sage buckwheat, salvia, and chaparral. Some cutleaf ceanothus, scrub oaks, and pine trees also occur.

In a typical profile, the surface layer is dark grayish-brown and brown fine sandy loam about 12 inches thick. The next layer is yellowish-brown gravelly coarse sandy loam. At a depth of about 17 inches is pale-yellow, strongly weathered mica-schist. Rock outcrops cover 2 to 10 percent of the surface.

The Sheephead soils are near the Crafton, Tollhouse, and Crouch soils.

Sheephead soils are used for dryland pasture and range and as a source of water.

Sheephead rocky fine sandy loam, 15 to 75 percent slopes, eroded (SpG2).—This hilly to very steep soil occurs on uplands. Rock outcrops cover 2 to 10 percent of the surface.

Following is a typical profile on a south-facing slope of 35 percent (1,450 feet west and 1,850 feet south of the northeast corner of section 19, T. 7 S., R. 4 E.):

O—¼ inch to 0, decomposing brush and leaf litter.

A11—0 to 5 inches, dark grayish-brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; abundant fine and very fine roots; many, very fine, irregular pores; neutral (pH 7.2); clear, irregular boundary Horizon is 2 to 6 inches thick.

A12—5 to 12 inches, brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) when moist; moderate, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; abundant fine and very fine roots; many, very fine, and few, fine, tubular pores; neutral (pH 7.2); abrupt, wavy to irregular boundary. Horizon is 5 to 8 inches thick.

C1—12 to 17 inches, yellowish-brown (10YR 5/6, dry or moist) gravelly coarse sandy loam; massive; hard, friable, nonsticky and nonplastic; plentiful fine and very fine roots; few, fine, tubular pores; slightly acid (pH 6.5); abrupt, irregular boundary. Horizon is 3 to 6 inches thick.

C2—17 inches, pale-yellow (2.5Y 7/4), strongly weathered mica-schist, light olive brown (2.5Y 5/4) when moist; massive; medium acid (pH 6.0).

The A horizon is neutral to slightly acid in reaction, brown to dark grayish brown in color, and sandy loam to fine sandy loam in texture. The C1 horizon is yellowish-brown to light yellowish-brown sandy loam to gravelly coarse sandy loam. Depth to the strongly weathered mica-schist or gneiss commonly ranges from 10 to 20 inches.

Included with this soil in mapping are small areas of Crafton rocky fine sandy loam, Crouch sandy loam, and Tollhouse sandy loam.

Permeability of this soil is moderately rapid. The available water holding capacity is 1.0 to 2.0 inches. Runoff is rapid, and the hazard of erosion is high. The root zone is 10 to 20 inches deep. Natural fertility is low.

This Sheephead soil is used for range and as a source of water. (Capability unit VIIe-4 (20) dryland; Shallow Loamy Uplands range site)

Sheephead fine sandy loam, 8 to 15 percent slopes, eroded (SnD2).—The profile of this soil is similar to that described for the Sheephead series, but less than 2 percent of the surface is occupied by rock outcrops. Included with this soil in mapping are small areas of gravelly fine sandy loam. Also included are small areas that have slopes of 15 to 25 percent.

Runoff is medium on this soil, and the hazard of erosion is moderate. The available water holding capacity is 1.0 to 2.0 inches.

This soil is used for pasture and for nonfarm purposes. (Capability unit VIec-4 (20) dryland; Shallow Loamy Uplands range site)

Soboba Series

Soils of the Soboba series are on talus slopes and alluvial fans. Slopes range from 2 to 25 percent. These excessively drained soils developed in alluvium from predominantly very gravelly, very cobbly, or stony granitic materials. Elevations range from 900 to 2,500 feet. The average annual rainfall ranges from 10 to 12 inches, the average annual temperature from 62° to 67° F., and the average frost-free season from 220 to 260 days. Vegetation consists chiefly of annual grasses, forbs, and chamise.

In a typical profile, the surface layer is grayish-brown stony loamy sand about 11 inches thick. The substratum is grayish-brown, stratified very gravelly and cobbly sand and loamy sand.

The Soboba soils are near the Tujunga and Hanford soils.

Soboba soils are used for pasture and range and for nonfarm purposes.

Soboba stony loamy sand, 2 to 15 percent slopes (SsD).—This gently sloping to strongly sloping soil occurs on talus slopes and alluvial fans. Many channels, which emerge from the steep mountain fronts, are across the strongly sloping alluvial cones and in the gently to moderately sloping drainages that traverse the uplands Braided stream channels cover the alluvial cones.

Following is a typical profile on a southwest-facing slope of 10 percent (1,200 feet east and 200 feet north of the southwest corner of section 14, T. 4 S., R. 1 W.):

A1—0 to 11 inches, grayish-brown (2.5Y 5/2) stony loamy sand, dark grayish brown (2.5Y 4/2) when moist; single grain; loose (dry or moist), nonsticky and nonplastic; abundant medium and fine roots; many, fine, irregular pores; neutral (pH 7.0); clear, smooth boundary. Horizon is 8 to 14 inches thick.

C—11 to 60 inches, grayish-brown (2.5Y 5/2), stratified, very gravelly and cobbly sand and loamy sand, dark grayish brown (2.5Y 4/2) when moist; this horizon is somewhat lighter in color than the A1 horizon; single grain; loose (dry or moist), nonsticky and nonplastic; common medium and fine roots; many, fine, irregular pores; neutral (pH 6.8).

The A horizon is slightly acid to mildly alkaline in reaction and is pale brown, brownish gray, or grayish brown in color. It is gravelly, cobbly, or stony to very gravelly, very cobbly, or very stony coarse sand to loamy fine sand. The C horizon is generally slightly acid to mildly alkaline. It is very gravelly, very cobbly, or very stony loamy sand to coarse sand.

Included with this soil in mapping are small areas of Tujunga loamy sand and Hanford coarse sandy loam. Small areas of Soboba soils having slopes of 15 to 25 percent are also included.

Permeability of this soil is very rapid. Runoff is slow, and the hazard of erosion is slight. The available water holding capacity is 2.5 to 3.5 inches. The root zone is more than 60 inches deep. Natural fertility is low.

This Soboba soil is used for range and for nonfarm purposes. (Capability unit VIIw-4 (19) dryland; Sandy Alluvial range site)

Soboba cobbly loamy sand, 2 to 25 percent slopes (SrE).—The profile of this soil is similar to that described for the Soboba series, but most of the coarse fragments are cobblestones. Areas of this soil are not channeled.

Runoff is medium, and the hazard of erosion is moderate.

This soil is used for dryland pasture and for nonfarm purposes. (Capability unit VIIs-4 (19) dryland; Sandy Alluvial range site)

Soper Series

In the Soper series are well-drained soils on uplands. Slopes range from 15 to 50 percent. These soils developed

on weakly consolidated marine conglomerate and sandstone. Elevations range from 600 to 1,500 feet. The average annual rainfall ranges from 10 to 16 inches, the average annual temperature from 60° to 63° F., and the average frost-free season from 250 to 300 days. Vegetation consists chiefly of annual grasses and there are a few forbs.

In a typical profile, the surface layer is dark grayish-brown loam about 6 inches thick. The subsoil is dark grayish-brown, brown, and yellowish-brown clay loam, gravelly clay loam, and gravelly loam. At a depth of about 26 inches is yellowish-brown weathered conglomerate.

The Soper soils are near the Gaviota and Altamont soils.

Soper soils are used for dryland pasture and range.

Soper loam, 15 to 35 percent slopes, eroded (StF2).—This hilly to steep soil occurs on uplands.

Following is a typical profile on a north-facing slope of 26 percent (700 feet south and 650 feet east of the north quarter corner of section 18, T. 3 S., R. 7 W.):

A—0 to 6 inches, dark grayish-brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) when moist; moderate, fine, subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; abundant very fine and few fine roots; common, fine, random, tubular pores; slightly acid (pH 6.1); 5 percent gravel; clear, smooth boundary. Horizon is 6 to 8 inches thick.

B1—6 to 10 inches, dark grayish-brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) when moist; moderate, medium, subangular blocky structure; hard, firm, sticky and slightly plastic; abundant very fine and few fine roots; common, fine, random, tubular pores; very few thin clay films line tubular pores; slightly acid (pH 6.3); 5 percent gravel; clear, irregular boundary. Horizon is 4 to 8 inches thick.

B21t—10 to 14 inches, brown (10YR 5/3) clay loam, brown (10YR 4/3) when moist; moderate, medium, subangular blocky structure; hard, firm, sticky and slightly plastic; plentiful very fine roots; common, fine, random, tubular pores; few thin clay films line tubular pores; slightly acid (pH 6.3); 10 percent gravel; clear, irregular boundary. Horizon is 4 to 8 inches thick.

B22t—14 to 21 inches, brown (10YR 5/3) gravelly clay loam, brown (10YR 4/3) when moist; strong, medium, subangular blocky structure; very hard, very firm, sticky and plastic; few very fine roots; few, fine, random, tubular pores; few moderately thick clay films on ped faces and in pores; slightly acid (pH 6.3); 15 percent gravel; clear, irregular boundary. Horizon is 7 to 12 inches thick.

B3—21 to 26 inches, yellowish-brown (10YR 5/4) gravelly loam, dark yellowish brown (10YR 4/4) when moist; weak, medium, subangular blocky structure; hard, firm, slightly sticky and slightly plastic; very few very fine roots; few, very fine, random, tubular pores; very few thin clay films in pores; slightly acid (pH 6.5); 20 percent gravel; abrupt, smooth boundary. Horizon is 5 to 10 inches thick.

C—26 inches, yellowish-brown (10YR 5/4) conglomerate, dark yellowish brown (10YR 4/4) when moist; massive; slightly acid (pH 6.5); 30 percent cobblestones in a matrix of weakly cemented material.

The A horizon is light yellowish brown to dark grayish brown in color and is 6 to 8 inches thick. The Bt horizon is brown to reddish-brown clay loam or gravelly clay loam to sandy clay loam. The C horizon is slightly acid to mildly alkaline, yellowish-brown to light brownish-gray weathered conglomerate. Depth to the conglomerate ranges from 20 to 36 inches.

Included with this soil in mapping are small areas of Gaviota very fine sandy loam and Altamont clay. Also included is a soil that is 15 to 26 inches deep to weathered conglomerate.

Permeability of this soil is moderately slow. The available water holding capacity is 3.0 to 5.0 inches. Runoff is medium, and the hazard of erosion is moderate. The root zone is 26 to 36 inches deep. Natural fertility is moderate.

This Soper soil is used for dryland pasture and range. (Capability unit VIe-1 (19) dryland; Loamy range site)

Soper cobbly loam, 25 to 50 percent slopes, eroded (SuF2).—The profile of this soil is similar to that described for the Soper series, but it has a cobbly loam surface layer and is 20 to 36 inches deep to weathered conglomerate.

Included with this soil in mapping are some areas that are 10 to 20 inches deep to weathered sandstone and marine conglomerate. Also included are very small areas having sandstone rock outcrops.

Runoff is rapid on this soil, and the hazard of erosion is high. The available water holding capacity is 1.5 to 5.0 inches. The root zone is 20 to 36 inches deep.

This soil is used for range. (Capability unit VIIe-1 (19) dryland; Loamy range site)

Temescal Series

The Temescal series consists of well-drained soils on uplands. Slopes range from 15 to 50 percent. These soils developed on predominantly latite-porphyry or gabbro. Elevations range from 1,000 to 3,500 feet. The average annual rainfall ranges from 10 to 18 inches, the average annual temperature from 59° to 63° F., and the average frost-free season from 240 to 280 days. Vegetation is chiefly annual grasses, forbs, and chamise.

In a typical profile, the surface layer is grayish-brown and brown loam about 17 inches deep. It is underlain by light yellowish-brown, partly weathered and fractured latite-porphyry. Rock outcrops cover 2 to 10 percent of the surface. The Temescal soils are near the Cajalco and Las Posas soils.

Temescal soils are used for dryland pasture and range. Where they occur in fields of more suitable soils, small isolated areas are irrigated and planted to citrus.

Temescal rocky loam, 15 to 50 percent slopes, eroded (TbF2).—This hilly to steep soil occurs on uplands. Rock outcrops cover 2 to 10 percent of the surface.

Following is a typical profile on a northeast-facing slope of 30 percent (1,050 feet north and 200 feet east of the south quarter corner of section 3, T. 4 S., R 6 W.):

A11—0 to 6 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; moderate, medium, granular structure; soft, very friable, slightly sticky and nonplastic; abundant very fine and fine roots; abundant, very fine, irregular and tubular pores; slightly acid (pH 6.2); clear, smooth boundary. Horizon is 2 to 6 inches thick.

A12—6 to 13 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; moderate, medium, granular structure; slightly hard, very friable, slightly sticky and nonplastic; abundant very fine roots; abundant, very fine, tubular pores; common angular rock fragments; neutral (pH 6.8); gradual, wavy bounday. Horizon is 4 to 10 inches thick.

A13—13 to 17 inches, brown (10YR 5/3) loam, dark brown (10YR 3/3) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic;

abundant very fine roots; abundant, very fine, tubular pores; neutral (pH 6.8); clear, wavy boundary. Horizon is 4 to 7 inches thick.

R—17 inches, light yellowish-brown (10YR 6/4) and light brownish-gray (10YR 6/2) partly weathered and fractured latite-porphyry; very hard, becoming harder and less fractured with increasing depth; few very fine medium roots in fractures. Many feet thick.

The A horizon is neutral to slightly acid in reaction and brown to grayish brown in color. It is a loam and generally contains a few angular pebbles or cobblestones. Depth to the latite-porphyry or gabbro commonly ranges from 10 to 20 inches.

Included with this soil in mapping are small areas of Cajalco fine sandy loam and Las Posas rocky loam. Also included are some small areas of an unnamed very shallow rocky loam and some areas on slopes of 8 to 15 percent.

Permeability of this soil is moderate. The available water holding capacity is 1.5 to 2.5 inches. Runoff is rapid, and the hazard of erosion is high. The root zone is 10 to 20 inches deep. Natural fertility is low.

This Temescal soil is used for range. (Capability unit VIIe-1 (19) dryland; Shallow Loamy range site)

Temescal loam, 15 to 50 percent slopes, eroded (TaF2).—There are essentially no rock outcrops in areas mapped as this soil. Included in mapping are a few small areas that have slopes of 8 to 15 percent.

Runoff is rapid on this soil, and the hazard of erosion is moderate. Natural fertility is moderate.

This soil is used for dryland pasture and range. Where included in fields of more suitable soils, small isolated areas are planted to citrus. (Capability unit VIIe-1 (19) dryland; Shallow Loamy range site)

Terrace escarpments (TeG) consist of variable alluvium on terraces or barrancas. Slopes range from 30 to 75 percent. Small areas of recently deposited alluvium may be near the bottom of the escarpments. This land type may have exposed "rim pan," gravel, cobblestones, stones, or large boulders in variable quantities. Approximately one-fourth of the acreage is made up of eroded spots and active gullies that head toward the terrace top.

This land is unaltered alluvial outwash derived from granite, gabbro, metamorphosed sandstone, sandstone, or mica-schist. It has various soil profiles that are commonly truncated. The material is light grayish brown to brown in color and slightly acid to neutral in reaction.

Vegetation is annual grasses, salvia, flat-top buckwheat, and chamise. This land is generally idle where it is included in tilled fields, but if the fields are pastured, some forage is provided. Where this land is near areas of cropland, it furnishes a habitat for small game, such as rabbits, doves, and quail. (Capability unit VIIe-1 (19) dryland; Shallow Loamy range site)

Tollhouse Series

Soils of the Tollhouse series are excessively drained and occur on the uplands. Slopes range from 5 to 50 percent. These soils developed on weathered granodiorite and granite. Elevations range from 3,500 to 8,500 feet. The average annual rainfall ranges from 10 to 25 inches, the average annual temperature from 52° to 57° F., and the average frost-free season from 150 to 200 days. Vegetation is chiefly annual grasses, forbs, redshank, and manzanita.

In a typical profile, the surface layer is brown coarse sandy loam and sandy loam about 9 inches thick. The next layer is very pale brown coarse sand. At a depth of about 18 inches is light-gray granodiorite. Rock outcrops cover 2 to 10 percent of the surface.

Tollhouse soils are near the Mottsville, Crouch, Crafton, and Sheephead soils.

Tollhouse soils are used for dryland pasture and range. Small tracts are used for dryland grain.

Tollhouse rocky coarse sandy loam, 8 to 50 percent slopes, eroded (TfF2).—This rolling to steep soil occurs on uplands. Rock outcrops cover 2 to 10 percent of the surface.

Following is a typical profile on a northeast-facing slope of 35 percent (400 feet west of the east quarter corner of section 9, T. 8 S., R. 3 E.):

A11—0 to 2 inches, brown (10YR 5/3) coarse sandy loam, dark brown (10YR 3/3) when moist; weak, medium, crumb structure; soft, very friable, nonsticky and nonplastic; abundant very fine roots; many, very fine, irregular pores; medium acid (pH 6.0); clear, smooth boundary. Horizon is 1 to 4 inches thick.

A12—2 to 9 inches, brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) when moist; moderate, medium, subangular blocky structure; soft, very friable, nonsticky and nonplastic; abundant very fine and few fine roots; many, very fine, irregular pores; medium acid (pH 6.0); abrupt, wavy boundary. Horizon is 3 to 8 inches thick.

C—9 to 18 inches, very pale brown (10YR 7/3) coarse sand, pale brown (10YR 6/3) when moist; massive; soft, very friable, nonsticky and nonplastic; plentiful very fine roots; medium acid (pH 6.0); gradual, wavy boundary. Horizon is 6 to 12 inches thick.

R—18 inches, light-gray (10YR 7/2) granodiorite, light brownish gray (10YR 6/2) when moist; massive; medium acid (pH 6.0); cleavage planes have inclusions of fine material.

The A horizon is brown to grayish brown to dark grayish brown. The C horizon is very pale brown to yellowish-brown sandy loam to coarse sand. Depth to partly weathered granodiorite ranges from 10 to 20 inches.

Included wtih this soil in mapping are small areas of Mottsville loamy sand, Crouch sandy loam, Crafton fine sandy loam, and Sheephead fine sandy loam. Also included are some small areas of an unnamed rocky loamy sand or cobbly sandy loam.

Permeability of this soil is rapid. The available water holding capacity is 0.5 to 1.5 inches. Runoff is rapid, and the hazard of erosion is high. The root zone is 10 to 20 inches deep. Natural fertility is low.

This Tollhouse soil is used for dryland pasture and range. (Capability unit VIIe-4 (20) dryland; Shallow Loamy Uplands range site)

Tollhouse sandy loam, 5 to 15 percent slopes, eroded (ThD2).—The profile of this soil is similar to that described for the Tollhouse series, but it has a dark grayish-brown sandy loam surface layer. The surface is essentially free of rock outcrops.

Included with this soil in mapping are small areas having slopes of 2 to 5 percent.

Permeability of this soil is moderately rapid. The available water holding capacity is 1.0 to 2.5 inches. Runoff is medium, and the hazard of erosion is moderate. Natural fertility is low.

This soil is used for dryland pasture, some grain, and range. (Capability unit VIIe-1 (20) dryland; Shallow Loamy Uplands range site)

Tollhouse sandy loam, 15 to 25 percent slopes, eroded (ThE2).—The profile of this soil is similar to that described for the Tollhouse series, but it has a dark grayish-

brown sandy loam surface layer. The surface is essentially free of rock outcrops.

Included with this soil in mapping are small areas that have slopes of 25 to 50 percent.

Permeability of this soil is moderately rapid. The available water holding capacity is 1.0 to 2.5 inches. Runoff is medium, and the hazard of erosion is moderate.

This soil used for dryland pasture and range. (Capability unit VIIe-1 (20) dryland; Shallow Loamy Uplands range site)

Traver Series

In the Traver series are moderately well drained soils on valley plains and in basins. Slopes range from 0 to 5 percent. These slightly to strongly saline-alkali soils developed in alluvium predominantly from granitic materials. Elevations range from 600 to 1,700 feet. The average annual rainfall ranges from 10 to 14 inches, the average temperature from 61° to 64° F., and the average frost-free season from 220 to 260 days. Vegetation is chiefly annual grasses, saltgrass, alkali weeds, and forbs.

In a typical profile, the surface layer is light brownish-gray to grayish-brown loamy fine sand about 13 inches thick. The subsoil is grayish-brown to light brownish-gray fine sandy loam to a depth of about 38 inches. Below this, to a depth of about 53 inches, the subsoil is light brownish-gray loam. It is underlain by light brownish-gray loam.

The Traver soils are near the Dello, Grangeville, and Waukena soils.

Traver soils are used for dryland grain and pasture and, if irrigated, for alfalfa, permanent pasture, and grain. They are also used for homesites and other nonfarm purposes. Slightly saline-alkali Traver soils are used for irrigated potatoes, sugar beets, and melons.

Traver loamy fine sand, saline-alkali, eroded (Tr2).—This nearly level to gently sloping soil has slopes of 0 to 5 percent on valley plains and in basins.

Following is a typical profile on a north-facing slope of 1 percent (2,200 feet east of the southwest corner of section 30, T. 4 S., R. 1 W.):

Ap—0 to 6 inches, light brownish-gray (10YR 6/2) loamy fine sand, very dark grayish brown (10YR 3/2) when moist; weak, medium, subangular blocky structure and weak, fine, granular structure; soft, very friable, nonsticky and nonplastic; few fine roots; many fine pores; moderately alkaline (pH 8.0); clear, smooth boundary. Horizon is 3 to 11 inches thick.

A1—6 to 13 inches, grayish-brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2 when moist; weak, medium, subangular blocky structure and weak, fine, granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; many fine pores; moderately alkaline (pH 8.0); abrupt, wavy boundary. Horizon is 5 to 8 inches thick.

B21t—13 to 19 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; moderate, medium, prismatic structure; very hard, friable, nonsticky and nonplastic; few fine roots; many fine pores; common thin clay films; moderately alkaline (pH 8.0); gradual, smooth boundary. Horizon is 4 to 20 inches thick.

B22t—19 to 24 inches, grayish-brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; moderate, medium, angular blocky structure; very hard, friable, nonsticky and nonplastic; few roots; few fine pores; moderately alkaline (pH 8.4); slightly effervescent; small pockets of soft lime present; clear, smooth boundary. Horizon is 4 to 12 inches thick.

B23t—24 to 38 inches, light brownish-gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive; very hard, firm, slightly sticky and plastic; few fine roots; few fine pores; very strongly alkaline (pH 9.4); strongly effervescent; lime throughout; gradual, irregular boundary. Horizon is 7 to 14 inches thick.

B3ca—38 to 53 inches, light brownish-gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) when moist; massive; slightly hard, friable, slightly sticky and plastic; no roots; very few pores; very strongly alkaline (pH 9.2); violently effervescent; calcareous nodular concretions, most of them soft and effervescent; gradual, irregular boundary. Horizon is 8 to 21 inches thick.

C—53 to 60 inches, light brownish-gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) when moist; massive; slightly hard, firm, slightly sticky and slightly plastic; no roots; very few pores; very strongly alkaline (pH 9.2); strongly to violently effervescent.

The A horizon is noneffervescent to slightly effervescent and slightly to moderately saline-alkali. It is light brownish-gray to grayish-brown or gray loamy fine sand to sandy loam. The Bt horizon is moderately to very strongly alkaline, slightly to strongly effervescent, and moderately saline-alkali. This horizon is light-gray to light brownish-gray to dark grayish-brown fine sandy loam to silt loam. The C horizon is strongly to very strongly alkaline and strongly to violently effervescent. It is light-gray to light brownish-gray to grayish-brown fine sandy loam to silty clay loam.

Included with this soil in mapping are small areas of Dello loamy fine sand, Grangeville loamy fine sand, and Waukena fine sandy loam. Also included are some small severely eroded areas, areas with a loamy sand surface layer, and areas with a hardpan at a depth of 48 to 60 inches.

Permeability of this soil is moderate. The available water holding capacity is 7.0 to 10.0 inches. Runoff is slow, and the hazard of erosion is slight. The root zone is more than 60 inches deep. Natural fertility is low.

This Traver soil is used for irrigated alfalfa, for dryland grain and pasture, and for homesites. (Capability unit IIIs-6 (19) irrigated; Sandy Basin range site)

Traver loamy fine sand, eroded (0 to 5 percent slopes) **(Tp2).**—The profile of this soil is similar to that described for the Traver series, but it is only slightly saline-alkali. Included in mapping are areas with a loamy sand substratum and a few areas with a loamy sand or fine sandy loam surface layer.

The hazard of erosion on this soil is slight to moderate. Natural fertility is moderate.

This soil is used for irrigated truck crops and alfalfa, for dryland grain and pasture, and for homesites. (Capability unit IIe-1 (19) irrigated; Sandy Basin range site)

Traver fine sandy loam, saline-alkali (0 to 2 percent slopes) **(Ts).**—This soil has a profile similar to that described for the Traver series, but it has a fine sandy loam surface layer. There is little erosion on this soil. Included in mapping are areas where the substratum is sandy loam.

Natural fertility of this soil is moderately low.

This soil is used for permanent pasture and alfalfa, for dryland grain and pasture, and for homesites. (Capability unit IIIs-6 (19) irrigated; Sandy Basin range site)

Traver fine sandy loam, strongly saline-alkali, eroded (0 to 5 percent slopes) **(Tt2).**—The profile of this soil is similar to that described for the Traver series, but it has

a light-gray fine sandy loam surface layer and a light-gray loam, silt loam, or clay loam subsoil.

Permeability of this soil is moderately slow.

This soil is used for permanent pasture, for dryland grain and pasture, and for homesites. (Capability unit IVs-6 (19) irrigated; Sandy Basin range site)

Tujunga Series

The Tujunga series consists of excessively drained soils on alluvial fans and flood plains. Slopes range from 0 to 8 percent. These soils developed in alluvium from predominantly granitic materials. Elevations range from 600 to 3,500 feet. The average annual rainfall ranges from 9 to 14 inches, the average annual temperature from 59° to 64° F., and the average frost-free season from 200 to 280 days. Vegetation is chiefly annual grasses, forbs, chamise, and willows. Also, there are a few cottonwoods.

In a typical profile, the surface layer is light-gray loamy sand about 10 inches thick. Below this layer are light-gray fine sand and sand.

The Tujunga soils are near the Soboba, Delhi, and Hanford soils.

Tujunga soils are used for dryland pasture and grain and, if irrigated, for truck crops, grapes, and grain. They are also used for nonfarm purposes.

Tujunga loamy sand, channeled, 0 to 8 percent slopes (TvC).—This gently to moderately sloping soil occurs on alluvial fans and flood plains. There are many small braided channels and, on the lesser slopes of the larger drainageways, more deeply cut, meandering channels.

Following is a typical profile on a southeast-facing slope of 2 percent (1,000 feet south and 450 feet east of the north quarter corner of section 15, T. 2 S., R. 5 W.):

Ap—0 to 10 inches, light-gray (10YR 6/1) loamy sand, gray (10YR 5/1) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; abundant very fine roots; very porous; neutral (pH 7.0); low in organic matter; clear, smooth boundary. Horizon is 6 to 18 inches thick.

C1—10 to 36 inches, light-gray (10YR 7/1) fine sand, gray (10YR 5/1) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; abundant very fine roots; neutral (pH 7.0); very low in organic matter; gradual, smooth boundary. Horizon is 3 to 28 inches thick.

C2—36 to 60 inches, light-gray (10YR 7/1) sand, light gray (10YR 6/1) when moist; single grain; loose when dry or moist, nonsticky and nonplastic; neutral (pH 7.0).

The A horizon is neutral to slightly acid in reaction, light gray to grayish brown in color, and loamy fine sand to coarse sand in texture. The C horizon is slightly acid to mildly alkaline, light-gray to gray loamy fine sand to coarse sand.

Included with this soil in mapping are small areas of Delhi loamy fine sand and Soboba cobbly loamy sand. Also included are some small areas that have a sandy loam or loamy sand surface layer that is underlain by gravelly coarse sand at a depth of 24 to 40 inches. A few unchanneled areas are included.

Permeability of this soil is rapid. The available water holding capacity is 2.0 to 5.0 inches. Runoff is very slow. The hazard of erosion by wind is high. The root zone is more than 60 inches thick. Natural fertility is low.

This Tujunga soil is used for dryland grain, pasture, and range and, if protected from flooding, for irrigated truck crops. Some areas are used for nonfarm purposes. (Capability unit VIIw-4 (19) dryland; Sandy Alluvial range site)

Tujunga loamy sand, 0 to 5 percent slopes (TuB).—The profile of this soil is similar to that described for the Tujunga series, but it has a substratum of gravelly coarse sand at a depth of 24 to 40 inches. Included with this soil in mapping are small areas that have a gravelly loamy sand surface layer. Also included are small areas having slopes of 5 to 8 percent.

Runoff is slow on this soil, and the hazard of erosion is slight. The root zone is 24 to 40 inches deep, and the available water holding capacity is 2 to 3 inches.

This soil is used for dryland pasture and grain, for irrigated alfalfa, and for homesites. (Capability unit IVs-0 (19) irrigated; Sandy range site)

Tujunga gravelly loamy sand, 0 to 8 percent slopes (TwC).—The profile of this soil differs from that described as typical for the Tujunga series because it is gravelly loamy sand throughout. A few small areas that have slopes of 8 to 15 percent and one area having slopes of 15 to 25 percent are included with this soil in mapping.

The available water holding capacity of this soil is 3.5 to 4.0 inches, Runoff is slow, and the hazard of erosion is slight.

This soil is used for irrigated grapes, dryland grain and pasture, and for homesites. (Capability unit IVs-4 (19) irrigated; Sandy range site)

Vallecitos Series

In the Vallecitos series are well-drained soils on uplands. Slopes range from 8 to 50 percent. These soils developed on fine-grained metamorphosed sandstone and shale. Elevations range from 600 to 2,500 feet. The average annual rainfall ranges from 9 to 18 inches, the average annual temperature from 61° to 64° F., and the average frost-free season from 220 to 300 days. Vegetation is chiefly annual grasses, forbs, chamise, and scrub oaks. Also, there are a few California live oaks.

In a typical profile, the surface layer is brown loam about 8 inches thick. The subsoil is reddish-brown loam and heavy clay loam about 12 inches thick. The parent material is fractured, metamorphosed, fine-grained sandstone with clay films on the structure faces.

The Vallecitos soils are near the Lodo, Friant, Fallbrook, and Escondido soils.

Vallecitos soils are used for dryland grain, range, and pasture. They also are used for citrus if they are irrigated as part of a field made up largely of more suitable soils.

Vallecitos loam, 8 to 25 percent slopes, severely eroded (VaE3).—This rolling to hilly soil occurs on uplands. Severe erosion is indicated by washing and deposition in dead furrows, by rills and small gullies in dry-farmed grainfields, by small areas of deposition in places where the slope decreases, and by head cutting shallow gullies in the range areas.

Following is a typical profile on a northwest-facing slope of 10 percent (200 feet west of the east quarter corner of section 34, T. 7 S., R. 4 W.):

A—0 to 8 inches, brown (10YR 5/3) loam, dark brown (10YR 3/3) when moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; abundant very fine roots; many, very fine, irregular and common, fine, tubular pores; strongly acid (pH 5.5); clear, smooth boundary. Horizon is 2 to 10 inches thick.

B1—8 to 12 inches, reddish-brown (5YR 5/4) heavy loam, dark reddish brown (5YR 3/4) when moist; weak, very fine, subangular blocky structure; hard, friable, slightly sticky and slightly plastic;

abundant very fine roots; many, very fine, irregular and tubular pores; few thin clay films; strongly acid (pH 5.5); clear, wavy boundary. Horizon is 3 to 7 inches thick.

B2t—12 to 20 inches, reddish-brown (5YR 5/4) heavy clay loam, reddish brown (5YR 4/4) when moist; strong, medium, subangular blocky structure; hard, firm, sticky and plastic; plentiful very fine roots; common, very fine, irregular and tubular pores; continuous moderately thick clay films on ped faces; slightly acid (pH 6.2); clear, irregular boundary. Horizon is 3 to 8 inches thick.

R—20 inches, gray, metamorphosed, fine-grained sandstone; clay films on fractured planes.

The A horizon is slightly acid to strongly acid in reaction and dark brown to brown to grayish brown in color. The B horizon is slightly acid to strongly acid, reddish brown to dark brown to yellowish brown, and loam to sandy clay loam or heavy clay loam. The R layer is fine-grained metamorphosed sandstone or shale and occurs at a depth of 10 to 20 inches.

Included with this soil in mapping are small areas of Lodo gravelly loam, Friant fine sandy loam, Fallbrook sandy loam, and Escondido fine sandy loam. Also included are some small areas with a gravelly loam surface layer and areas having slopes of 5 to 8 percent.

Permeability of this soil is moderately slow. The available water holding capacity is 2.0 to 3.0 inches. Runoff is rapid, and the hazard of erosion is high. The root zone is 10 to 20 inches deep. Natural fertility is moderately low.

This Vallecitos soil is used for dryland pasture and range. (Capability unit VIIe–1 (19) dryland; Shallow Loamy range site)

Vallecitos rocky loam, 8 to 50 percent slopes, eroded (VdF2).—The profile of this soil is similar to that described for the Vallecitos series, but it is grayish brown throughout the profile. Rock outcrops cover 2 to 10 percent of the surface. Erosion is indicated by a few shallow gullies, by areas in which all of the original surface layer has been washed away, and by deposition of soil material in the less sloping areas.

Included with this soil in mapping are small areas having a gravelly loam or stony loam surface layer. Also included are small areas that have slopes of 5 to 8 percent.

Runoff is rapid on this soil, and the hazard of erosion is high.

This soil is used for pasture and range. (Capability unit VIIe–1 (19) dryland; Shallow Loamy range site)

Vallecitos Series, Thick Solum Variant

The Vallecitos series, thick solum variant, consists of well-drained soils of the uplands. Slopes range from 2 to 50 percent. These soils devolped on fine-grained metamorphosed sandstone and shale. Elevations range from 600 to 2,500 feet. The average annual rainfall ranges from 9 to 18 inches, the average annual temperature from 61° to 64° F., and the average frost-free season from 220 to 300 days. Vegetation is chiefly annual grasses, forbs, chamise, and scrub oaks. Vallecitos soils, thick solum variant, are associated with the Friant, Lodo, Escondido, and other Vallecitos soils.

Typically, the surface layer is yellowish-brown and brown loam about 8 inches thick. The subsoil is reddish-brown and yellowish-red clay loam and sandy clay about 19 inches thick. The substratum is reddish-yellow loam. At about 48 inches is the metamorphosed sandstone parent material.

Vallecitos soils, thick solum variant, are used for dryland range, pasture, and grain and, if irrigated, for alfalfa and citrus.

Vallecitos loam, thick solum variant, 2 to 8 percent slopes, eroded (VeC2).—This undulating to gently rolling soil occurs on uplands. Erosion is indicated by the thin surface layer, washing in dead furrows, rills and small gullies in dryfarmed fields, and the larger headcutting gullies in overgrazed pasture areas. In most places where the slope changes from gently rolling to undulating there are areas of deposition in the drains.

Following is a typical profile on a southeast-facing slope of 4 percent (100 feet east and 50 feet south of the west quarter corner of section 7, T. 5 S., R. 3 W.):

Ap—0 to 5 inches, yellowish-brown (10YR 5/4) loam, dark brown (10YR 3/3) when moist; moderate, medium, subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; few very fine roots; many, very fine, and few, fine, tubular pores; slightly acid (pH 6.2); clear, smooth boundary. Horizon is 3 to 8 inches thick.

A1—5 to 8 inches, brown (7.5YR 5/4) loam, dark brown (10YR 3/3) when moist; moderate, medium, subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many, very fine, and few, fine, tubular pores; slightly acid (pH 6.2); clear, wavy boundary. Horizon is 2 to 6 inches thick.

B1t—8 to 13 inches, reddish-brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) when moist; moderate, medium, subangular blocky structure; extremely hard, firm, sticky and plastic; plentiful very fine and fine roots; common, very fine, and few, fine, tubular pores; few thin clay films on ped faces, few bridges, and few thin clay films lining pores; moderately alkaline (pH 8.0); clear, wavy boundary. Horizon is 4 to 6 inches thick.

B21t—13 to 22 inches, reddish-brown (5YR 5/4) clay loam, dark reddish brown (5YR 3/4) when moist; moderate, very coarse, angular blocky structure parting to strong, coarse, angular blocky structure; extremely hard, firm, sticky and plastic; plentiful very fine and few fine inped roots and abundant very fine and fine exped roots; many, very fine, and common, fine, tubular pores; common thin clay films on ped faces and lining tubular pores; moderately alkaline (pH 8.0); gradual, wavy boundary. Horizon is 8 to 12 inches thick.

B22t—22 to 27 inches, yellowish-red (5YR 4/6) sandy clay, yellowish red (5YR 4/6) when moist; strong, medium, angular blocky structure; extremely hard, very firm, very sticky and very plastic; plentiful micro and very fine roots; many, very fine, and common, fine, tubular pores; few moderately thick and common thin clay films on ped faces; thin clay films line tubular pores; moderately alkaline (pH 8.0); clear, irregular boundary. Horizon is 5 to 9 inches thick.

C1—27 to 40 inches, reddish-yellow (5YR 6/6) loam, yellowish red (5YR 4/6) when moist; massive; very hard, firm, slightly sticky and slightly plastic; few very fine roots in cleavage planes; few thin clay films in cleavage planes; moderately alkaline (pH 8.0); clear, irregular boundary. Horizon is 9 to 16 inches thick.

C2—40 to 48 inches, reddish-yellow (5YR 6/6) loam, yellowish red (5YR 5/6) when moist; massive; very hard, firm, slightly sticky and slightly plastic; no roots; occasional manganese stains; moderately alkaline (pH 8.0); clear, irregular boundary. Horizon is 8 to 15 inches thick.

R—48 inches, very pale brown (10YR 7/3) to light-gray (10YR 6/1) slightly weathered metamorphosed sandstone.

The A horizon is slightly acid to neutral in reaction, yellowish brown to brown in color, and fine sandy loam to loam in texture. The Bt horizon is slightly acid to moderately alkaline in reaction, pale brown to reddish brown or yellowish red in

color, and clay loam to sandy clay in texture. The R horizon is fine-grained metamorphosed sandstone or shale. Depth to the parent rock ranges from 39 to 50 inches.

Included with this soil in mapping are a few small areas that are 50 to 60 inches deep to parent material. Also included are areas having a fine sandy loam or gravelly loam surface layer.

Permeability of this soil is moderately slow. The available water holding capacity is 4.0 to 5.0 inches. Runoff is medium, and the hazard of erosion is moderate. The root zone is 39 to 50 inches deep. Natural fertility is moderate.

This Vallecitos soil is used for dryland pasture and grain and for irrigated alfalfa. (Capability unit IIIe–8 (19) irrigated; Loamy range site)

Vallecitos loam, thick solum variant, 8 to 15 percent slopes, eroded (VeD2).—The profile of this soil is similar to that described for the Vallecitos series, thick solum variant, but it has a dark-brown surface layer.

Included with this soil in mapping are a few small areas having a gravelly loam surface layer. Runoff is rapid on this soil, and the hazard of erosion is moderate. Natural fertility is moderate.

This soil is used for irrigated citrus and for dryland grain and pasture. (Capability unit IVe–8 (19) irrigated; Loamy range site)

Vallecitos loam, thick solum variant, 15 to 50 percent slopes, eroded (VeF2).—This hilly to steep soil occurs on uplands. Its profile is similar to that described as typical for the Vallecitos series, thick solum variant, but it has a brown loam to very fine sandy loam surface layer. At a depth of 20 to 39 inches is partly weathered sandstone or shale.

Included with this soil in mapping are small areas of Gaviota very fine sandy loam and Altamont clay. Some small included areas have a heavy loam subsoil and others are calcareous in the lower subsoil and parent material.

Runoff is medium to rapid on this soil, and the hazard of erosion is moderate to high. The available water holding capacity is 2.5 to 4.0 inches. The root zone is 20 to 39 inches deep.

This soil is used for dryland pasture and range. (Capability unit VIe–1 (19) dryland; Loamy range site)

Visalia Series

In the Visalia series are somewhat poorly drained soils on alluvial fans and in valley fills. Slopes range from 0 to 8 percent. These soils developed in alluvium predominantly from granitic materials. Elevations range from 1,000 to 2,500 feet. The average annual rainfall ranges from 10 to 14 inches, the average annual temperature from 59° to 63° F., and the average frost-free season from 200 to 260 days. Vegetation is chiefly annual grasses, forbs, and chamise.

Typically, the surface layer is dark-gray and very dark grayish-brown sandy loam about 18 inches thick. The substratum is dark-gray fine sandy loam that extends to a depth of more than 60 inches.

The Visalia soils are near the Tujunga, Gorgonio, and Hanford soils.

Visalia soils are used for dryland grain and pasture and for irrigated alfalfa.

Visalia sandy loam, 0 to 8 percent slopes, eroded (VlC2).—This drained nearly level to moderately sloping soil occurs on alluvial fans and valley fills.

Following is a typical profile on a north-facing slope of 3 percent (800 feet north and 1,050 feet east of the south quarter of section 33, T. 8 S., R. 2 W.):

A11—0 to 10 inches, dark-gray (10YR 4/1) sandy loam, very dark gray (10YR 3/1) when moist; weak, medium, crumb structure; soft, friable, nonsticky and nonplastic; abundant very fine roots; slightly acid (pH 6.1); gradual, smooth boundary. Horizon is 6 to 20 inches thick.

A12—10 to 18 inches, very dark grayish-brown (10YR 3/2) sandy loam, very dark gray (10YR 3/1) when moist; massive; slightly hard, friable, nonsticky and nonplastic; plentiful very fine roots; plentiful, very fine, discontinuous pores; slightly acid (pH 6.5); gradual, smooth boundary. Horizon is 6 to 12 inches thick.

C1—18 to 26 inches, dark-gray (10YR 4/1) fine sandy loam, very dark gray (10YR 3/1) when moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine vertical roots; plentiful, very fine, discontinuous pores; neutral (pH 7.0); gradual, smooth boundary. Horizon is 8 to 16 inches thick.

C2—26 to 36 inches, dark-gray (10YR 4/1) fine sandy loam, very dark gray (10YR 3/1) when moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots; plentiful, very fine, discontinuous pores; mildly alkaline (pH 7.5); gradual, smooth boundary. Horizon is 8 to 12 inches thick.

C3—36 to 60 inches, dark-gray (10YR 4/1) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; massive; slightly hard, friable, nonsticky and nonplastic; very few roots; plentiful, very fine, discontinuous pores; moderately alkaline (pH 7.9).

The A horizon is slightly acid to medium acid in reaction, very dark grayish brown to dark gray and very dark gray in color, and sandy loam to coarse sandy loam in texture. The C horizon is neutral to moderately alkaline, dark-gray to grayish-brown coarse sandy loam to fine sandy loam.

Included with this soil in mapping are small areas of Tujunga loamy sand, Gorgonio loamy sand, and Hanford sandy loam. Also included is an unnamed soil that has a gravelly loamy sand or coarse loamy sand substratum at a depth of 24 to 36 inches. Some small inclusions have slopes of 8 to 15 percent. A few included areas sometimes have a water table at a depth of 24 to 48 inches. Some inclusions are braided with stream channels and are slightly saline-alkali.

This soil has altered drainage, and there is no longer a water table present. Runoff is slow to medium, and the hazard of erosion is moderate. Permeability is moderately rapid. The available water holding capacity is 7.5 to 9.5 inches. The root zone is more than 60 inches deep. Natural fertility is high.

This Visalia soil is used for dryland grain and pasture. (Capability unit IIe–1 (19) irrigated; Loamy range site)

Visalia fine sandy loam, 0 to 2 percent slopes (VmA).—The profile of this soil is similar to that described for the Visalia series, but it has a fine sandy loam texture throughout.

Included with this soil in mapping is an unnamed soil with a loamy fine sand to coarse loamy sand substratum.

Runoff is slow on this soil, and the hazard of erosion is slight. The available water holding capacity is 9.0 to 10.0 inches. The original water table has been removed.

This soil is used for irrigated alfalfa and for dryland grain and pasture. (Capability unit I–1 (19) irrigated; Loamy range site)

Visalia fine sandy loam, 2 to 8 percent slopes (VmC).—The profile of this soil is similar to that described for the Visalia series, but it has a fine sandy loam texture throughout.

Included with this soil in mapping is an unnamed soil with a loamy sand substratum. Also included are small areas of Visalia soils on slopes of 8 to 15 percent.

Runoff is slow to medium on this soil, and the hazard of erosion is slight to moderate. The available water holding capacity is 9.0 to 10.0 inches. The original water table has been lowered and is no longer a limitation.

This soil is used for irrigated alfalfa and for dryland grain and pasture. (Capability unit IIe–1 (19) irrigated; Loamy range site)

Vista Series

In the Vista series are well-drained soils of the uplands. Slopes range from 2 to 35 percent. These soils developed on weathered granite and granodiorite. Elevations range from 1,000 to 3,500 feet. The average annual rainfall ranges from 10 to 15 inches, the average annual temperature from 59° to 64° F., and the average frost-free season from 200 to 260 days. Vegetation is chiefly annual grasses, forbs, and chaparral. In a few areas the plant cover consists of grasses and oaks.

Typically, the surface layer is brown and grayish-brown coarse sandy loam about 15 inches thick. The subsoil is brown gravelly coarse sandy loam about 9 inches thick. Below this is weathered granodiorite containing yellow, white, and black feldspar.

Vista soils are near the Cieneba, Fallbrook, and Bonsall soils.

Vista soils are used for dryland pasture and grain and, if irrigated, for citrus, truck crops, and grain. They are also used for homesites.

Vista coarse sandy loam, 8 to 15 percent slopes, eroded (VsD2).—This rolling soil occurs on uplands.

Following is a typical profile on a northeast-facing slope of 12 percent (600 feet south and 400 feet east of the north quarter corner of section 18, T. 7 S., R. 1 E.):

A11—0 to 1 inch, brown (10YR 5/3) coarse sandy loam, very dark brown (10YR 2/2) when moist; very weak, medium and fine, crumb structure; slightly hard, very friable, nonsticky and nonplastic; abundant very fine roots; many, very fine, irregular pores; medium acid (pH 6.0); abrupt, smooth boundary. Horizon is 4 to 9 inches thick.

A12—1 to 9 inches, brown (10YR 5/3) coarse sandy loam, very dark grayish brown (10YR 3/2) when moist; moderate, medium and fine, crumb structure; slightly hard, very friable, nonsticky and nonplastic; abundant very fine and plentiful fine roots; few, fine, and many, very fine, irregular pores; slightly acid (pH 6.2); clear, smooth boundary. Horizon is 4 to 8 inches thick.

A3—9 to 15 inches, grayish-brown (10YR 5/2) coarse sandy loam, very dark grayish brown (10YR 3/2) when moist; horizon is 10 percent gravel; massive; slightly hard, very friable, nonsticky and nonplastic; abundant very fine roots; few, fine, and many, very fine pores: slightly acid (pH 6.5); clear, smooth boundary. Horizon is 4 to 7 inches thick.

B2—15 to 24 inches, brown (10YR 5/3) gravelly coarse sandy loam, dark grayish brown (10YR 4/2) when moist; horizon is 28 percent gravel; weak, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; abundant very fine roots; few, fine, and many, very fine, irregular pores; common thin clay films line tubular pores and common bridges; slightly acid (pH 6.5); clear, smooth boundary. Horizon is 8 to 12 inches thick.

C—24 to 30 inches, yellow, white, and black feldspar, quartz, and biotite from weathered granodiorite; massive; extremely hard, firm to friable, slightly sticky and slightly plastic; very few roots; slightly acid (pH 6.5).

The A horizon is medium acid to slightly acid in reaction, grayish brown to brown or dark brown in color, and coarse sandy loam to fine sandy loam in texture. The B horizon is slightly acid to neutral and yellowish brown to brown to dark grayish brown. It is coarse sandy loam to loam and may be gravelly. The C horizon is weathered granite or granodiorite that contains yellow, white, and black feldspar. Depth to the weathered granite or granodiorite ranges from 20 to 36 inches.

Included with this soil in mapping are small areas of Cieneba sandy loam, Fallbrook sandy loam, and Bonsall fine sandy loam. Also included are some areas of Vista soils that have a loamy sand, gravelly sandy loam, or fine sandy loam surface layer.

Permeability of this soil is moderately rapid. Runoff is medium, and the hazard of erosion is moderate. The available water holding capacity is 3.5 to 6.0 inches. The root zone is 20 to 36 inches deep. Natural fertility is moderate.

This Vista soil is used for irrigated citrus, for dryland grain and pasture, and for homesites. (Capability unit IVe–1 (19) irrigated; Loamy range site)

Vista coarse sandy loam, 2 to 8 percent slopes (VsC).—The profile of this soil is similar to that described for the Vista series, but it has a grayish-brown surface layer. Included with this soil in mapping are areas that are 36 to 54 inches deep to weathered granite. Also included are small areas of steambank erosion.

Runoff is slow on this soil, and the hazard of erosion is slight.

This soil is used for irrigated citrus and truck crops, for dryland grain and pasture, and for homesites. (Capability unit IIIe–1 (19) irrigated; Loamy range site)

Vista coarse sandy loam, 15 to 35 percent slopes, eroded (VsF2).—The profile of this soil is similar to that described for the Vista series, but it has a grayish-brown surface layer. Included with this soil in mapping are areas that are 36 to 54 inches deep to weathered granite. Also included are areas of Vista soils that have a fine sandy loam surface layer and areas having slopes of 35 to 50 percent.

Runoff is medium on this soil, and the hazard of erosion is moderate.

This soil is used for dryland pasture and, where included in fields of more suitable soils, for irrigated citrus. It is also used for homesites. (Capability unit VIe–1 (19) dryland; Loamy range site)

Vista rocky coarse sandy loam, 2 to 35 percent slopes, eroded (VtF2).—Rock outcrops cover 2 to 10 percent of the surface in areas mapped as this soil. Included in mapping are small areas of an unnamed cobbly sandy loam. Also included are small areas that are 36 to 54 inches deep to weathered granite and small areas with streambank erosion.

Runoff is medium on this soil, and the hazard of erosion is moderate. Natural fertility is moderately low.

This soil is used for dryland pasture and, where it occurs in fields of more suitable soils, it is used for irrigated grain and citrus. It is also used for homesites. (Capability unit VIe–7 (19) dryland; Loamy range site)

Waukena Series

The Waukena series consists of moderately well drained soils in basins and on flood plains. Slopes are 0 to 2

percent. These soils developed in alluvium predominantly from granitic materials. They generally are moderately to strongly saline-alkali. Elevations range from 600 to 1,800 feet. The average annual rainfall ranges from 9 to 14 inches, the average annual temperature from 62° to 65° F., and the annual frost-free season from 200 to 250 days. Vegetation is chiefly annual grasses, saltgrass, and forbs.

Typically, the surface layer is grayish-brown fine sandy loam about 11 inches thick. The subsoil is grayish-brown clay loam about 13 inches thick. The substratum is white clay loam or sandy clay loam and extends to a depth of more than 60 inches.

Waukena soils are associated with the Grangeville, Chino, Traver, and Willows soils.

Waukena soils are used for dryland grain and pasture and, if irrigated, for alfalfa and permanent pasture. They are also used for nonfarm purposes.

Waukena fine sandy loam, saline-alkali (0 to 2 percent slopes) **(Wb)**.—This nearly level soil is in basins and on flood plains. It is moderately saline-alkali.

Following is a typical profile on a south-facing slope of 1 percent (50 feet north of the southwest corner of section 35, T. 2 S., R. 7 W.):

A1—0 to 5 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; massive; hard, friable, nonsticky and nonplastic; plentiful fine roots; few, fine, tubular pores; moderately alkaline (pH 8.2); clear, smooth boundary. Horizon is 1 to 9 inches thick.

A2—5 to 11 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; massive; hard, friable, nonsticky and plastic; a few bleached sand grains; plentiful fine roots; few, fine and medium, tubular pores; strongly alkaline (pH 8.6); abrupt, wavy to irregular boundary. Horizon is 1 to 6 inches thick.

B2t—11 to 18 inches, grayish-brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) when moist; strong, coarse, prismatic structure; very hard, firm, sticky and plastic; plentiful fine exped roots; common, fine, tubular pores; many thick clay films on peds; very strongly alkaline (pH 9.6); strongly effervescent; lime in seams and soft masses; clear, smooth boundary. Horizon is 3 to 20 inches thick.

B3tca—18 to 24 inches, grayish-brown (10YR 5/2) in a matrix of 60 percent white (10YR 8/2) clay loam, dark grayish brown (10YR 4/2) and light brownish gray (10YR 6/2) when moist; weak, coarse, angular blocky structure; very hard, firm, slightly sticky and plastic; few very fine roots; many, fine, tubular pores; common moderately thick clay films in pores; very strongly alkaline (pH 9.6); violently effervescent; clear, smooth boundary. Horizon is 5 to 24 inches thick.

C1—24 to 32 inches, white (5Y 8/2) clay loam, light olive gray (5Y 6/2) when moist; a few fine prominent mottles are present; massive; very hard, firm, slightly sticky and plastic; few very fine roots; few, fine, tubular pores; very strongly alkaline (pH 9.6); violently effervescent; lime disseminated and in irregular, medium and large concretions; clear, smooth boundary. Horizon is 4 to 24 inches thick.

C2—32 to 47 inches, white (5Y 8/2) clay loam, light olive gray (5Y 6/2) when moist; a few fine prominent mottles are present; massive; very hard, firm, sticky and plastic; few, fine, tubular pores; strongly alkaline (pH 8.6); strongly effervescent; lime disseminated and in irregular, medium and large concretions; clear, smooth boundary. Horizon is 12 to 18 inches thick.

C3—47 to 60 inches, white (5Y 8/2) sandy clay loam, olive gray (5Y 5/2) when moist; massive; very hard, firm, sticky and slightly plastic; few, fine, tubular pores; moderately alkaline (pH 8.4); violently effervescent; lime disseminated and in irregular, medium and large concretions.

The A horizon is moderately alkaline to strongly alkaline in reaction, light gray to dark grayish brown in color, and sandy loam to fine sandy loam in texture. The B horizon is strongly alkaline to very strongly alkaline and strongly to violently effervescent. It is gray to grayish-brown to dark-brown sandy clay loam to clay. The C horizon is moderately alkaline to very strongly alkaline and strongly to violently effervescent. This horizon is pale yellow to dark yellowish brown to white in color and fine sandy loam to clay in texture.

Included with this soil in mapping are small areas of Grangeville loamy fine sand, Traver loamy fine sand, Chino silt loam, and Willows silty clay. Also included are some slightly saline-alkali areas and some areas having slopes of 2 to 5 percent.

Permeability of this soil is slow. Runoff is slow, and the hazard of erosion is slight. The available water holding capacity is 8.5 to 10.0 inches. The root zone is greater than 60 inches deep. Natural fertility is moderately low.

This Waukena soil is used for irrigated alfalfa and permanent pasture, for dryland grain and pasture, and for homesites. (Capability unit IIIs-6 (19) irrigated; Sandy Basin range site)

Waukena fine sandy loam, strongly saline-alkali (0 to 2 percent slopes) **(Wc)**.—Included with this soil in mapping are small areas of moderately saline-alkali soils. Also included are areas that have slopes of 2 to 5 percent.

Runoff is very slow on this soil.

This soil is used for irrigated permanent pasture, for dryland grain and pasture, and for nonfarm purposes. (Capability unit IVs-6 (19) irrigated; Sandy Basin range site)

Waukena loam, saline-alkali (0 to 2 percent slopes) **(Wd)**.—The profile of this soil is similar to that described for the Waukena series, but it has a loam surface layer and a brown sandy clay subsoil. This moderately saline-alkali soil occurs where the saline-alkali parts of the alluvial fans meet the basin rims, mainly in the Ryan Field, Lakeview, and Brownlands areas. Prior to pumping for irrigation and building channels for flood control, about 20 to 30 years ago, this soil was under water part of the year.

Included with this soil in mapping are small areas of an unnamed soil that is underlain, at a depth of 30 to 54 inches, by an alkali pan of calcium carbonate with a silica-cemented crust. The profile of this included soil is brownish gray to grayish brown in color, and it lacks mottles in the Bt horizon. The normal surface horizon is only 1 inch to 3 inches thick and if mixed by cultivation with the clay loam or silty clay in the Bt horizon, has a texture of a loam or light clay loam. Also included are areas that are slightly saline-alkali; areas having slopes of 2 to 5 percent; and small areas where the texture of the surface layer ranges to clay loam.

The available water holding capacity of this soil is 5.0 to 10.0 inches. Runoff is very slow.

This soil is used for irrigated permanent pasture, alfalfa, and grain; for dryland grain and pasture; and for nonfarm purposes. (Capability unit IIIs-6 (19) irrigated; Silty Basin range site)

Waukena loamy fine sand, saline-alkali (0 to 2 percent slopes) **(Wa)**.—The profile of this soil is similar to that described as typical for the Waukena series, but it

has a loamy fine sand surface layer. This soil is moderately saline-alkali.

Included with this soil in mapping are small areas of an unnamed gravelly loamy sand and areas that have a loamy sand surface layer. Also included are small areas having slopes of 2 to 5 percent.

The available water holding capacity of this soil is 6.5 to 9.5 inches. Runoff is very slow, and the hazard of erosion is moderate.

This soil is used for dryland grain and pasture, for irrigated permanent pasture, and for nonfarm purposes. (Capability unit IIIs–6 (19) irrigated; Sandy Basin range site)

Wet alluvial land (WeD) is on alluvial fans and in valley fills. Slopes range from 0 to 15 percent. This land developed in alluvium that was recently deposited in narrow mountain valleys and is subject to wet conditions. A water table is usually present.

The alluvium is generally sandy loam, fine sandy loam, or very fine sandy loam in texture, but in places it is loam. The color is normally dark grayish brown and brown to very dark brown or black, and mottling occurs. Drainage is somewhat poor or poor.

The vegetation is water-tolerant sedges and other plants. Above an elevation of 3,500 feet, areas of this land are locally known as mountain meadows, or cienegas. If the water table is not lowered, these areas furnish pasture in the hot dry summer. Most of the meadows have an active gully that acts as a drain. (Capability unit VIw–1 (20) dryland; Cienega range site)

Willows Series

In the Willows series are poorly drained, saline-alkali soils in basins and on edges of alluvial fans. Slopes range from 0 to 2 percent. These soils developed in alluvium from predominantly fine-textured mixed materials. Elevations range from 1,200 to 1,700 feet. The average annual rainfall ranges from 10 to 13 inches, the average annual temperature from 61° to 64° F., and the average frost-free season from 210 to 250 days. Vegetation is chiefly annual grasses, saltgrass, alkali-lettuce, and forbs.

In a typical profile the surface layer is olive-gray and gray silty clay about 10 inches thick. The next layer is gray clay about 14 inches thick. Below this, to a depth of several feet, is light-gray and olive-gray silty clay.

The Willows soils are near the Chino, Domino, Madera, and Exeter soils.

Willows soils are used for dryland grain and pasture and, if irrigated, for grain, alfalfa, and permanent pasture. They are also used for nonfarm purposes, especially duckponds.

Willows silty clay, saline-alkali (0 to 2 percent slopes) **(Wg)**.—This nearly level to gently sloping soil is in basins and on edges of alluvial fans. It is moderately saline-alkali.

Following is a typical profile on a southwest-facing slope of 1 percent (200 feet north of the south quarter corner of section 33, T. 4 S., R. 3 W.):

Ap—0 to 6 inches, olive-gray (5Y 5/2) silty clay, dark olive gray (5Y 3/2) when moist; moderate, fine, granular structure; hard, firm, sticky and very plastic; abundant micro and very fine roots; few, very fine, tubular pores; moderately alkaline (pH 8.2); strongly effervescent; clear, smooth boundary. Horizon is 3 to 12 inches thick.

A1—6 to 10 inches, gray (5Y 5/1) silty clay, dark olive gray (5Y 3/2) when moist; strong, medium, subangular blocky structure; very hard, very firm, sticky and very plastic; abundant very fine and micro roots; few very fine pores; moderately alkaline (pH 8.2); strongly effervescent; gradual, smooth boundary. Horizon is 4 to 14 inches thick.

AC—10 to 24 inches, gray (5Y 5/1) clay, olive gray (5Y 4/2) when moist; strong, medium, subangular blocky structure; extremely hard, very firm, very sticky and very plastic; few very fine roots; few very fine pores; many slickensides; moderately alkaline (pH 8.4); strongly effervescent; gradual, smooth boundary. Horizon is 5 to 14 inches thick.

C1—24 to 30 inches, olive-gray (5Y 5/2) silty clay, olive gray (5Y 4/2) when moist; strong, medium, subangular blocky structure; extremely hard, very firm, very sticky and very plastic; few very fine roots; few fine pores; many slickensides; moderately alkaline (pH 8.4); strongly effervescent; few seams of calcium carbonate and calcium sulfate; gradual, smooth boundary. Horizon is 4 to 16 inches thick.

C2cacs—30 to 42 inches, light-gray to gray (5Y 6/1) silty clay, dark gray (5Y 4/1) when moist; moderate, coarse, angular blocky structure; very hard, very firm, sticky and plastic; moderately alkaline (pH 8.4); strongly effervescent; many calcium sulfate seams and some lime concretions; abrupt, wavy boundary. Horizon is 12 to 21 inches thick.

C3cacs—42 to 60 inches, olive-gray (5Y 5/2) silty clay, olive gray (5Y 4/2) when moist; weak, coarse, angular blocky structure; very hard, very firm, sticky and plastic; moderately alkaline (pH 8.4); strongly effervescent; many seams of gypsum and some lime concretions.

The A horizon is moderately alkaline to strongly alkaline in reaction. It is light gray to olive gray to dark grayish brown in color and heavy silty clay loam to silty clay in texture. The AC and C1 horizons are generally moderately alkaline to very strongly alkaline, light-gray to olive-gray silty clay to clay. The C2 and C3 horizons are moderately alkaline to strongly alkaline. These horizons are gray to olive-gray silt loam to silty clay that contains seams of gypsum and variable lime concretions.

Included with this soil in mapping are small areas of Chino silt loam, Domino silt loam, Madera fine sandy loam, and Exeter sandy loam. Also included are some small areas cut by stream channels, some areas having a silt loam surface layer, and a few small areas with a loam or fine sandy loam substratum.

Permeability of this soil is slow. Runoff is slow, and the hazard of erosion is slight. The available water holding capacity is 8.0 to 10.0 inches. The root zone is more than 60 inches deep. A water table occurs at a depth of 36 to 60 inches. Natural fertility is moderately low.

This Willows soil is used for dryland grain and pasture, for irrigated alfalfa, and for homesites. (Capability unit IIIw–6 (19) irrigated; Silty Basin range site)

Willows silty clay (0 to 2 percent slopes) **(Wf)**.—This soil is slightly saline-alkali. Included with it in mapping are small areas having slopes of 2 to 5 percent. Also included are areas with a silt loam surface layer, and a few small areas where a water table is at a depth of 36 to 60 inches.

Runoff is very slow on this soil. Natural fertility is moderate.

This soil is used for irrigated alfalfa and permanent pasture, for dryland grain and pasture, and for homesites. (Capability unit IIIw–5 (19) irrigated; Silty Basin range site)

Willows silty clay, strongly saline-alkali (0 to 2 percent slopes) **(Wh)**.—The profile of this soil is similar to

that described for the Willows series, but it has a light brownish-gray substratum. Included in mapping are small areas of moderately saline-alkali soils. Also included are soils having a silty clay loam surface layer.

Runoff is very slow on this soil. Natural fertility is low.

This soil is used for dryland grain and pasture and for nonfarm purposes. (Capability unit IVw-6 (19) irrigated; Silty Basin range site)

Willows silty clay, deep, saline-alkali (0 to 2 percent slopes) **(Wm)**.—The profile of this soil is similar to that described for the Willows series, but it is 36 to 48 inches deep over thin, light-gray lenses that are cemented by lime and silica. Included in mapping are small areas having slopes of 2 to 5 percent. Also included are areas that are only 24 to 36 inches deep to the thin, cemented lenses.

Runoff is very slow on this soil. The available water holding capacity is 5.0 to 8.0 inches. The root zone is 36 to 48 inches deep.

This soil is used for irrigated alfalfa, for dryland grain and pasture, and for homesites. (Capability unit IIIw-6 (19) irrigated; Silty Basin range site)

Willows silty clay, deep, strongly saline-alkali (0 to 2 percent slopes) **(Wn)**.—The profile of this soil is similar to that described for the Willows series, but it is 36 to 48 inches deep over thin, light-gray lenses that are cemented by silica and lime. Included with this soil in mapping are small areas having slopes of 2 to 5 percent. Also included are areas that are only 24 to 36 inches deep to the cemented lenses.

Runoff is very slow on this soil. The available water holding capacity is 5.0 to 8.0 inches. The root zone is 36 to 48 inches deep.

This soil is used for dryland grain and pasture and for nonfarm uses. (Capability unit IVw-6 (19) irrigated; Silty Basin range site)

Wyman Series

Soils of the Wyman series are well drained and lie on alluvial fans. Slopes range from 2 to 15 percent. These soils developed in alluvium from predominantly basic igneous materials. Elevations range from 1,000 to 2,500 feet. The average annual rainfall ranges from 9 to 14 inches, the average annual temperature from 61° to 64° F., and the average frost-free season from 220 to 280 days. Vegetation is chiefly annual grasses, forbs, chamise, and black sage.

Typically, the surface layer is brown loam about 10 inches thick. The subsoil is reddish-brown loam and clay loam about 40 inches thick. The substratum is yellowish-red coarse sandy loam.

The Wyman soils are associated with the Honcut and Buren soils.

Wyman soils are used for dryland pasture and grain and, if irrigated, for citrus, alfalfa, and truck crops.

Wyman loam, 2 to 8 percent slopes, eroded (WyC2).—This gently sloping to moderately sloping soil occurs on alluvial fans.

Following is a typical profile on an east-southeast-facing slope of 5 percent (450 feet west and 200 feet north of the southeast corner of section 14, T. 5 S., R. 2 W.):

A11—0 to 6 inches, brown (7.5YR 5/4) loam, dark brown (7.5YR 3/2) when moist; weak, medium, granular structure; slightly hard, friable, slightly sticky and slightly plastic; abundant very fine roots; very fine irregular pores; slightly acid (pH 6.5); gradual, smooth boundary. Horizon is 4 to 10 inches thick.

A12—6 to 10 inches, brown (7.5YR 5/4) loam, dark brown (7.5YR 3/2) when moist; moderate, fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; abundant very fine roots; many, very fine, tubular pores; neutral (pH 6.8); clear, smooth boundary. Horizon is 4 to 17 inches thick.

B1t—10 to 14 inches, reddish-brown (5YR 4/4) heavy loam, dark reddish brown (5YR 3/3) when moist; weak, medium, subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; common, very fine, tubular pores; patchy thin clay films on ped faces and in pores; neutral (pH 7.0); gradual, wavy boundary. Horizon is 4 to 12 inches thick.

B21t—14 to 25 inches, reddish-brown (5YR 4/4) clay loam; dark reddish brown (5YR 3/3) when moist; weak, medium, subangular blocky structure; slightly hard, firm, sticky and plastic; few very fine and fine roots; common, very fine, tubular pores; patchy clay films on ped faces and in pores; mildly alkaline (pH 7.5); gradual, smooth boundary. Horizon is 6 to 12 inches thick.

B22t—25 to 36 inches, reddish-brown (5YR 4/4) heavy loam, dark reddish brown (5YR 3/3) when moist; weak, medium, subangular blocky structure; slightly hard, firm, slightly sticky and plastic; few very fine roots; many, very fine, tubular pores; mildly alkaline (pH 7.5); gradual, smooth boundary. Horizon is 5 to 12 inches thick.

B3—36 to 50 inches, reddish-brown (5YR 4/4) loam, dark reddish brown (5YR 3/4) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; mildly alkaline (pH 7.5); gradual, smooth boundary. Horizon is 6 to 14 inches thick.

C—50 to 60 inches, yellowish-red (5YR 5/6) coarse sandy loam, dark reddish brown (5YR 3/4) when moist; massive; soft, very friable, nonsticky and nonplastic; mildly alkaline (pH 7.5).

The A horizon is neutral to slightly acid in reaction and brown to grayish brown in color. The Bt horizon is generally neutral to moderately alkaline, brown to reddish brown, and fine sandy loam to clay loam. The C horizon is mildly to moderately alkaline, yellowish-red to dark-brown coarse sandy loam to loam.

Included with this soil in mapping are small areas of Honcut sandy loam, Honcut loam, and Buren loam. Also included are some areas of severely eroded Wyman fine sandy loam, areas that have a gravelly loam or gravelly fine sandy loam surface layer, and areas with a slightly calcareous substratum. Some inclusions have slopes of 0 to 2 percent.

Permeability is moderately slow on this soil. Runoff is medium, and the hazard of erosion is moderate. The available water holding capacity is 7.5 to 10 inches. The root zone is more than 60 inches deep, and natural fertility is high.

This Wyman soil is used for irrigated citrus, truck crops, and alfalfa and for dryland grain and pasture. (Capability unit IIe-1 (19) irrigated; Loamy range site)

Wyman fine sandy loam, 8 to 15 percent slopes, eroded **(WxD2)**.—The profile of this soil is similar to that described for the Wyman series, but it has a fine sandy loam surface layer and a brown loam subsoil.

Small areas having a gravelly fine sandy loam or a very fine sandy loam surface layer are included with this soil in mapping. Also included are areas that have slopes of 15 to 25 percent.

Runoff is medium on this soil, and the hazard of erosion is moderate.

This soil is used for irrigated citrus and for dryland

grain and pasture. (Capability unit IIIe-1 (19) irrigated; Loamy range site)

Yokohl Series

The Yokohl series consists of well-drained soils on old alluvial fans and terraces. Slopes range from 2 to 25 percent. These soils developed in alluvium from predominantly basic igneous materials and are underlain by a hardpan. Elevations range from 1,000 to 3,000 feet. The average annual rainfall ranges from 10 to 14 inches, the average annual temperature from 60° to 64° F., and the average frost-free season from 220 to 280 days. Vegetation is chiefly annual grasses, forbs, chamise, and salvia.

Typically, the surface layer is reddish-brown loam about 10 inches thick. The subsoil is reddish-brown and dark-brown clay about 16 inches thick. At a depth of about 26 inches is a hardpan of reddish-yellow coarse sand.

The Yokohl soils are associated with the Porterville, Wyman, Buren, and Cajalco soils.

Yokohl soils are used for dryland grain and pasture and, if irrigated, for citrus.

Yokohl loam, 2 to 8 percent slopes (YbC).—This gently sloping to moderately sloping soil occurs on alluvial fans and terraces.

Following is a typical profile on a north-facing slope of 5 percent (1,900 feet south and 200 feet east of the north quarter corner of section 25, T. 4 S., R. 6 W.):

Ap—0 to 10 inches, reddish-brown (5YR 4/4) loam, dark reddish brown (5YR 3/4) when moist; coarse, medium, subangular blocky structure parting to fine, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; plentiful fine and very fine roots; few, fine and very fine, tubular pores; neutral (pH 7.2); abrupt, wavy boundary. Horizon is 6 to 14 inches thick.

B21t—10 to 16 inches, reddish-brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) when moist; strong, very coarse, prismatic structure parting to strong, coarse, angular blocky structure; hard, very firm, very sticky and very plastic; plentiful fine and very fine roots; few, fine and very fine, tubular pores; common, moderately thick clay films on ped faces and in pores; mildly alkaline (pH 7.6); clear, smooth boundary. Horizon is 5 to 10 inches thick.

B22t—16 to 22 inches, reddish-brown (2.5YR 4/4, dry or moist) heavy clay; strong, very coarse, angular blocky structure; hard, very firm, very sticky and very plastic; few fine and very fine roots; common, moderately thick clay films on ped faces and in tubular pores; numerous slickensides; moderately alkaline (pH 8.2); clear, smooth boundary. Horizon is 5 to 10 inches thick.

B3t—22 to 26 inches, reddish-brown (5YR 4/4, dry or moist) clay; massive; extremely hard, very firm, very sticky and very plastic; few fine and very fine roots; few thin clay films, mainly as bridges and pore fillings; moderately alkaline (pH 8.2); abrupt, smooth boundary. Horizon is 3 to 6 inches thick.

Cm—26 inches, reddish-yellow (5YR 6/6) indurated hardpan of coarse sand, light reddish brown and reddish yellow (5YR 6/4–6/6) when moist; massive; appears to have a reticulate opal covering on surface; no roots; moderately alkaline (pH 8.2).

The A horizon is neutral to medium acid in reaction, brown to reddish brown in color, and sandy loam to loam in texture. The Bt horizon is neutral to moderately alkaline and occasionally slightly effervescent. It is dark red to reddish brown and dark brown to dark grayish brown in color and heavy clay loam to clay in texture. The Cm horizon is mildly to moderately alkaline, dark reddish gray to reddish yellow, and coarse sand to sandy loam or, in some places, clay loam. Depth to the iron-silica cemented hardpan ranges from 19 to 40 inches. The hardpan is moderately to strongly cemented.

Included with this soil in mapping are small areas of Porterville clay, Wyman loam, Buren loam, and Cajalco fine sandy loam. Also included are some small areas having slopes of 0 to 2 percent, some slightly saline-alkali areas, and some areas having a gravelly loam or clay loam surface layer.

Runoff is medium on this soil, and the hazard of erosion is slight. Permeability is very slow. The available water holding capacity is 3.0 to 7.0 inches. The root zone is 19 to 40 inches deep, and natural fertility is moderate.

This Yokohl soil is used for irrigated citrus and for dryland pasture and grain. (Capability unit IVe-3 (19) irrigated; Claypan range site)

Yokohl loam, 8 to 15 percent slopes, eroded (YbD2).—Included with this soil in mapping are small areas with a gravelly loam or clay loam surface layer. Also included are areas having slopes of 15 to 25 percent. A few small inclusions are 15 to 20 inches deep to the hardpan.

Runoff is medium on this soil, and the hazard of erosion is moderate.

This soil is used for irrigated citrus and for dryland grain and pasture. (Capability unit IVe-3 (19) irrigated; Claypan range site)

Yokohl loam, 8 to 25 percent slopes, severely eroded (YbE3).—The profile of this soil is similar to that described for the Yokohl series, but it is 10 to 20 inches deep to the hardpan. Included in mapping are areas that have slopes of 2 to 8 percent. Also included is an unnamed loamy fine sand having slopes of 5 to 8 percent.

Runoff is rapid on this soil, and the hazard of erosion is high. The available water holding capacity is 2.0 to 3.0 inches. The root zone is 10 to 20 inches deep. Natural fertility is low.

This soil is used for dryland pasture and, if included in fields of more suitable soils, for grain. (Capability unit VIe-8 (19) dryland; Claypan range site)

Yokohl cobbly loam, 2 to 25 percent slopes, eroded (YkE2).—Included with this soil in mapping are small areas of severely eroded cobbly loam.

Runoff is rapid on this soil, and the hazard of erosion is high. The available water holding capacity is 2.5 to 6.5 inches.

This soil is used for dryland pasture and, if included in larger fields of more suitable soils, for grain. (Capability unit VIe-7 (19) dryland; Claypan range site)

Ysidora Series

In the Ysidora series are moderately well drained soils on old alluvial fans, in valley fills, and on terraces. Slopes range from 2 to 25 percent. These soils developed in alluvium predominantly of metasedimentary origin. They are underlain by an iron-silica cemented pan. Elevations range from 1,000 to 2,500 feet. The average annual rainfall ranges from 10 to 14 inches, the average annual temperature from 61° to 65° F., and the average frost-free season from 220 to 280 days. Vegetation is chiefly annual grasses, forbs, and chamise.

In a typical profile, the surface layer is brown gravelly very fine sandy loam and gravelly loam about 12 inches thick. The subsoil is reddish-brown and dark-brown gravelly clay loam about 17 inches thick. At a depth of

about 29 inches is an olive-gray hardpan. This iron-silica cemented pan breaks to gravelly sandy loam.

The Ysidora soils are associated with the Arbuckle and Perkins soils.

Ysidora soils are used for dryland grain and pasture, for irrigated olives and citrus, and for homesites.

Ysidora gravelly very fine sandy loam, 2 to 8 percent slopes, eroded (YsC2).—This gently to moderately sloping soil occurs on old alluvial fans and terraces or in small valley fills.

Following is a typical profile on a west-facing slope of 5 percent (1,200 feet east and 1,000 feet north of the southwest corner of section 5, T. 8 S., R. 3 W.):

A11—0 to 6 inches, brown (7.5YR 5/4) gravelly very fine sandy loam, dark brown (7.5YR 4/2) when moist; weak, medium, subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; abundant very fine roots; many, very fine, irregular pores; medium acid (pH 5.7); gradual, smooth boundary. Horizon is 4 to 8 inches thick.

A12—6 to 12 inches, brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 4/2) when moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; abundant very fine roots; many, very fine, and common, fine, tubular pores; medium acid (pH 5.7); clear, wavy boundary. Horizon is 5 to 7 inches thick.

B21t—12 to 19 inches, reddish-brown (5YR 4/4) gravelly clay loam, dark reddish brown (5YR 3/4) when moist; moderate, medium, subangular blocky structure; hard, firm, sticky and plastic; abundant very fine roots; many, very fine, and common, fine, tubular pores; common moderately thick clay films on ped faces and in pores; slightly acid (pH 6.2); clear, wavy boundary. Horizon is 4 to 9 inches thick.

B22t—19 to 25 inches, reddish-brown (2.5YR 4/4) gravelly clay loam, dark reddish brown (2.5YR 3/4) when moist; moderate, medium, subangular blocky structure; hard, firm, sticky and plastic; abundant very fine roots; many, very fine, and few, fine, tubular pores; common moderately thick clay films on ped faces and in pores; slightly acid (pH 6.2); clear, wavy boundary. Horizon is 4 to 8 inches thick.

B3t—25 to 29 inches, dark-brown (7.5YR 4/4) gravelly clay loam, dark reddish brown (5YR 3/3) when moist; massive; hard, firm, sticky and plastic; few very fine roots; few, very fine, tubular pores; common moderately thick clay films in pores; slightly acid (pH 6.3); abrupt, wavy boundary. Horizon is 2 to 6 inches thick.

Cm—29 inches, olive-gray (5Y 4/2), indurated hardpan cemented with silica, dark olive gray (5Y 3/2) when moist; massive; neutral (pH 7.0).

The A horizon is medium acid to slightly acid in reaction, brown to yellowish brown in color, and loam to gravelly fine sandy loam or gravelly very fine sandy loam in texture. Generally, this horizon is 10 to 25 percent gravel. The Bt horizon is generally medium acid to slightly acid, reddish brown to brown, and gravelly loam to gravelly clay loam. The Cm horizon is neutral to mildly alkaline and in places slightly effervescent. It has a grayish-brown to brown or olive-gray hardpan that may be faintly mottled. Depth to the iron-silica pan ranges from 19 to 36 inches.

Included with this soil in mapping are small areas of Arbuckle gravelly loam and Perkins gravelly loam. Also included are some areas that have a very fine sandy loam surface layer.

Runoff is medium on this soil, and the hazard of erosion is moderate. The available water holding capacity is 3.5 to 5.0 inches. Permeability is very slow. The root zone is 19 to 36 inches deep. Natural fertility is moderate.

This Ysidora soil is used for irrigated citrus, for dryland grain and pasture, and for homesites. (Capability unit IIIe-8 (19) irrigated; Loamy range site)

Ysidora gravelly very fine sandy loam, 8 to 25 percent slopes, eroded (YsE2).—Small areas that have a cobbly fine sandy loam, very fine sandy loam, or fine sandy loam surface layer are included with this soil in mapping. Also included are small areas that are 36 to 42 inches deep to the hardpan.

Runoff is medium to rapid on this soil, and the hazard of erosion is moderate to high.

This soil is used for irrigated olives and for dryland grain and pasture. (Capability unit IVe-8 (19) irrigated; Loamy range site)

Ysidora gravelly very fine sandy loam, 8 to 25 percent slopes, severely eroded (YsE3).—The profile of this soil is similar to that described for the Ysidora series, but it is 10 to 20 inches deep to the hardpan. Areas of exposed subsoil occur.

Areas with a very fine sandy loam or cobbly fine sandy loam surface layer are included with this soil in mapping. Also included are areas of a severely eroded unnamed cobbly fine sandy loam soil over unrelated granite.

The available water holding capacity of this soil is 1.5 to 3.0 inches. Runoff is rapid, and the hazard of erosion is high. The root zone is 10 to 20 inches deep. Natural fertility is low.

This soil is used for dryland pasture and range. (Capability unit VIIe-1 (19) dryland; Shallow Loamy range site)

Ysidora very fine sandy loam, 2 to 15 percent slopes, eroded (YrD2).—The profile of this soil is similar to that described for the Ysidora series, but the surface layer is 5 to 10 inches thick and the gravel content is less than 15 percent.

Included with this soil in mapping are small areas that are 36 to 48 inches deep to the weakly to strongly silica-cemented layer. Also included are small areas having a fine sandy loam surface layer.

The available water holding capacity of this soil is 4.5 to 8.0 inches.

This soil is used for irrigated citrus, for dryland grain and pasture, and for homesites. (Capability unit IVe-8 (19) irrigated; Loamy range site)

Use and Management of the Soils

In this section the system of capability grouping used by the Soil Conservation Service is discussed, the soils in each capability unit are described, and management suited to the soils in each unit is suggested. Following this, estimated acre yields of the principal crops are listed for those soils that are widely used for crops and the Storie index rating of the soils is given. Then uses of the soils for range, for wildlife, for engineering purposes, and for recreational development are discussed.

Capability Grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The group-

ing does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or engineering.

In the capability system, all soils are grouped at three levels, the capability class, subclass, and unit. These are discussed in the following paragraphs.

Capability Classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

- Class I soils have few limitations that restrict their use.
- Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.
- Class III soils have severe limitations that reduce the the choice of plants, require special conservation practices, or both.
- Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.
- Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife. (None in the Western Riverside Area)
- Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife.
- Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.
- Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes.

Capability Subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, clayey, droughty, or stony; and *c*, shows that the chief limitation is a climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

Capability Units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils.

Capability units in California are given Arabic numbers after the subclass symbol that suggest the chief kind of limitation responsible for placement of the soils in the capability class and subclass. For this reason, some of the units within the subclasses are not numbered consecutively, and their symbols are a partial key to some of the soil features. The numeral used to designate units within subclasses are:

0. A problem or limitation of root penetration caused by sand and gravel in the substratum.
1. An actual or potential erosion hazard.
2. A problem or limitation of wetness caused by poor drainage or flooding.
3. A problem or limitation caused by slow or very slow permeability of the subsoil.
4. A problem or limitation caused by coarse soil texture or excessive gravel.
5. A problem or limitation caused by fine soil texture.
6. A problem or limitation caused by salt or alkali.
7. A problem or limitation caused by cobblestones, rocks, other stones, or rock outcrops.
8. A problem or limitation of root penetration caused by shallow depth of soil over hard bedrock or a hardpan.
9. A problem or limitation caused by low fertility or by toxicity (not used in this Area).

Land Resource Areas

In the Western Riverside Area, capability classification is further refined by designating the land resource area in which the soils in a unit occur. A land resource area is a broad geographic area that has a distinct combination of climate, soils, management needs, and cropping systems. The 48 conterminous States in the Nation have been divided into 156 land resource areas. Parts of two of these are in the Western Riverside Area, and are outlined on the General Soil Map. These areas and their numbers are Southern California Coastal Plain (19), and Southern California Mountains (20). The number of the resource area is added in parentheses, to the class, subclass, and unit designation.

It is necessary to make assumptions that affect management in a land resource area if soils are to be placed consistently in capability units. In the paragraphs that follow, those land resource areas having parts within the Western Riverside Area are described so that local farming can be related to the resource areas. Following the description of each resource area is a list of those conditions typical of the area that guided placement of the soils in capability classes and units.

Land Resource Area 19.—This resource area makes up the largest part of the survey area. The soils formed in

small to large intermediate valleys, in interior valleys, and on mountains. The topography, relief, and geology vary considerably in this resource area.

Elevations in the resource area range from 500 to 3,500 feet. Summers generally are hot, and winters are cool and moist. Rainfall ranges from about 9 to 18 inches and varies in amount from year to year. Supplemental irrigation is necessary for best growth of most crops, though dryland grain and hay are grown in some places.

The soils in Land Resource Area 19 are placed in capability units on the assumption that these conditions exist:

1. The temperature generally is mild, and the frost-free period ranges from 200 to 310 days. Frost occurs locally, but protection is provided for crops that have a high cash value.
2. Irrigation water is available for most irrigable soils. Much of the acreage intensively cropped is under irrigation. Irrigation is being expanded as quickly as water becomes economically available. All reasonable means are taken to conserve water. If the water supply is salty, drainage and leaching are needed to minimize damage to crops that are sensitive to salt.
3. The soils adjacent to unprotected stream channels are subject to occasional flooding. They are classified according to their capability for crops on basis of this flooding hazard. The somewhat poorly drained and poorly drained soils of the basins have a seasonal high water table. If suitable outlets are available and it is economically feasible, these soils are drained. If certain soil characteristics or qualities of the basin soils make drainage difficult and suitable drainage outlets are lacking, the soils are not drained. The drained basin soils are classified on basis of the recurrence or nonrecurrence of the water table, and the undrained ones, on basis of their continual drainage problem.
4. Saline and alkali soils are present in some basins and on the rims of some basins. If drainage is feasible, the basin soils are classified on the basis that maximum leaching and reduction of salts and alkali are possible. If drainage is not feasible, those basin soils are classified on the basis that leaching and reduction of salts and alkali cannot be accomplished.
5. A wide variety of the common field, truck, fruit, citrus, and nut crops are grown.
6. A high level of management is used.

Land Resource Area 20.—This resource area includes the northeastern and southeastern corners of the survey area. It is made up of nearly level to very steep soils on uplands and terraces and in small valleys. The soils formed in material weathered from granite, mica-schist, or gneiss or in alluvium derived from these rocks.

Elevations in the resource area range from 3,500 to 8,500 feet. Precipitation ranges from 9 to 30 inches. Most of the rainfall comes in winter and in spring. Rainfall is marginal for dryland crops at lower elevations. The growing season ranges from 80 to 180 days.

The soils in Land Resource Area 20 are placed in capability units on the assumption that these conditions exist:

1. Freezing temperatures are common throughout the resource area in winter and spring. Field and orchard crops that are winter hardy are the only suitable crops. Normally protection from frost is provided for orchard crops when the trees are in blossom and at the time the fruit is set. Occasional summer thunder showers may adversely affect growth of crops. During the growing season the temperature is warm enough for all the common field and orchard crops to mature.
2. Irrigation water generally is not available, because the supply of water in the resource area is limited and the cost of bringing water into the area is high. Use of local water supplies may be improved for limited use in the area. The soils of this resource area are classified on the basis of their capability for dryland crops as well as for irrigated crops.
3. A few partly drained mountain meadows are in the Area. The soils in these areas are classified on the basis that the areas remain in meadows or in pasture.
4. Areas of soils in this resource area that are affected by salts and alkali are not important enough to affect the capability classification.
5. The major crops in this resource area are hay and grain. Selected row crops and tree crops are grown where the climate is suited and where irrigation water is available.
6. The level of management is moderately high.

Management by Capability Units

In the pages that follow, the capability units in the Western Riverside Area are described and suggestions for the use and management for all the soils of each unit are given. Estimates for available water capacity given in each capability unit are to a depth of 60 inches or to a limiting layer if such a layer is at a depth of less than 60 inches.

The names of soil series represented are mentioned in the description of each capability unit. This does not mean, however, that all soils of a given series appear in the unit. The names of all soils in any given capability unit can be found by referring to the "Guide to Mapping Units" at the back of this survey. The capability units are not numbered consecutively, because not all units used in California occur in each capability class.

Capability unit I–1 (19) irrigated

In this unit are very deep, moderately well drained to well drained loamy very fine sands to silt loams. These soils are in the Chino, Garretson, Grangeville, Greenfield, Hanford, Pachappa, Ramona, San Emigdio, and Visalia series. Some of the soils are slightly affected by salts and alkali. Stratification exists in alluvial soils of the Chino, Garretson, Grangeville, Hanford, San Emigdio, and Visalia series. The Chino and Grangeville soils formed under somewhat poor drainage but are now drained. Slopes range from 0 to 2 percent.

Roots and water penetrate these soils readily. In places there is a slight increase in amount of clay in the subsoil that slightly reduces permeability. Available water capacity is more than 7.5 inches.

Soils in this unit are suited to citrus, avocados, walnuts, truck crops, specialty crops, field crops, and all other

crops grown in the Area. Most of these soils are in the colder parts of the survey area, however, and the growing of such frost-sensitive crops as citrus and avocados is limited.

If these soils are cultivated when moist, a tillage pan is likely to form. Land leveling can be done without exposing unfavorable underlying material. When leveled or shaped, these soils are highly productive under ordinary management. Only enough irrigation water is required to meet the needs of the crop grown. Growing green-manure crops and returning all crop residues to the soils are ways of improving soil fertility, structure, and tilth.

Capability unit I–1 (20) irrigated

Anza loam, 0 to 2 percent slopes, is the only soil in this unit. It is very deep and is moderately well drained. Texture throughout the profile ranges from loam to sandy loam.

Roots and water readily penetrate this soil. Available water capacity is 8.0 to 11.0 inches.

This soil is suited to all irrigated crops grown in the Area, but the short growing season limits the kind of crop grown. Small grains, potatoes, apples, and alfalfa seed are the chief crops.

If this soil is cultivated when moist, a tillage pan is likely to form. Land leveling can be done on this soil, however, without exposing unfavorable material. Over-irrigating should be avoided because it wastes expensive water and leaches plant nutrients from the soil. Growing green-manure crops and returning all crop residues and other organic materials to the soils are ways of improving soil structure, fertility, and tilth.

Capability unit IIe–1 (19) irrigated

In this unit are deep to very deep, well drained to moderately well drained soils of the Arbuckle, Arlington, Buren, Exeter, Garretson, Greenfield, Hanford, Honcut, Pachappa, Ramona, San Emigdio, Traver, Visalia, and Wyman series. These soils have a surface layer of coarse sandy loam to clay loam. Slopes range from 0 to 8 percent. Many of these soils are eroded, and some of the soils are gravelly. The soils in this unit are sloping and are subject to erosion, but they are otherwise similar to the soils in capability unit I–1 (19) irrigated.

Permeability of the subsoil is slightly restricted in places, but in most places roots and water penetrate these soils readily. Available water capacity is 5.0 to 11.0 inches.

The Visalia soils in this unit formed under somewhat poor drainage, but they are now drained. In some places such soils as the Arbuckle and Garretson contain some gravel. The Arlington, Buren, and Exeter soils are deep over a cemented hardpan.

These soils are suited to walnuts, truck crops, forage crops, field crops, specialty crops, and all other crops grown in the survey area. Air drainage is moderately good because these soils occupy sloping areas slightly above the valley floor. Citrus, avocados, and other crops sensitive to frost require protection in winter, and some sites are too cold for these crops. In many places, and particularly in orchards, a tillage pan is likely to form. Practices are needed for control of erosion in all cultivated areas. In places measures are needed for removing runoff water from adjacent soils. Moderate land leveling and land shaping can be done on all except the Arbuckle and Ramona soils in this unit.

Capability unit IIe–1 (20) irrigated

In this unit are very deep, moderately well drained and well drained sandy loams and loams of the Anza and Calpine series. Slopes range from 2 to 8 percent. The Calpine soils are eroded.

These soils formed in alluvium and are stratified in places, but the strata differ little in texture or permeability. Roots and water penetrate the soils readily. Available water capacity is 6.0 to 11.0 inches. These soils occur in areas where precipitation ranges from 10 to 16 inches or where water is available for irrigation.

These soils are suited to grain crops, forage crops, truck crops, and deciduous orchards. Growing cover crops and leaving stubble on the surface help to reduce runoff. Returning all crop residues to the soils increases the content of organic matter and improves soil fertility, structure, and tilth.

Capability unit IIe–4 (19) irrigated

In this unit are very deep, somewhat excessively drained and moderately well drained loamy sands to loamy very fine sands of the Delhi and Hilmar series. Slopes range from 0 to 2 percent. The Hilmar loamy sand is eroded.

The available water capacity is 5.0 to 7.5 inches. Permeability is rapid in most of these soils, which have a loamy sand or fine sandy loam substratum. It is moderately slow, however, in the Hilmar loamy sand, which has a clay loam substratum. The hazard of soil blowing is moderate on all of the soils. Water erosion is not a hazard.

Truck crops, grapes, alfalfa, irrigated pasture, and dryland pasture are among the crops grown on soils of this unit. Keeping a vegetative cover on the soils during the period when wind velocity is high helps to hold the soil in place. Irrigations are fairly frequent and light, and the water generally is applied by sprinklers. Plowing under cover crops and green-manure crops, or adding manure, are ways of improving fertility and the organic-matter content of these soils. Land leveling can be done without exposing unfavorable material.

Capability unit IIe–5 (19) irrigated

In this unit are moderately deep to very deep, well-drained soils of the Auld and Porterville series. These soils have a surface layer of clay. Depth to hard decomposing rock ranges from 31 to more than 60 inches. Slopes are dominantly 2 to 8 percent, but the range is from 0 to 8 percent. Some soils that have slopes of less than 2 percent are clay throughout.

Permeability is moderately slow to slow in these soils. The soils are fairly easy to manage. The erosion hazard is slight to moderate.

Most irrigated crops can be grown on these soils, but avocados generally are poorly suited. Air drainage is fairly good because the soils are either on slopes or are slightly above the valley floor. In some places citrus and avocados are likely to require protection from frost. Chlorosis induced by lime is a hazard if citrus is grown on soils that have a moderately calcareous subsoil and substratum.

Moderate land leveling and shaping can be done on these soils without exposing unfavorable material. Deep

cuts should be avoided, however, for in most places the subsoil contains considerable lime and responds poorly to management. If these soils are cultivated, a prominent tillage pan is not likely to develop. Tillage should, nevertheless, be kept to a minimum, and it should be done at the right moisture content. If these soils are tilled when too dry, large clods form that are hard to break. If tilled when too wet, these soils are likely to puddle and seal over. Because the infiltration rate is slow in these soils, irrigation water must be applied carefully.

Capability unit IIs–4 (19) irrigated

Soils in this unit are very deep and are moderately well drained to somewhat excessively drained. They are in the Garretson, Gorgonio, Grangeville, Hanford, Metz, and San Emigdio series. Their surface layer ranges from loamy sand to gravelly very fine sandy loam. The texture varies little throughout the soil profile, though some of the soils are stratified in places. Some soils, such as the Gorgonio and Metz, are underlain by finer textured material than that of the other soils, but this finer material does not limit penetration of water. San Emigdio soils are underlain by loamy sand. Slopes range from 0 to 8 percent.

Permeability is rapid to moderately rapid in these soils. Available water capacity is about 5.0 to 7.5 inches. The hazard of water erosion is slight.

In areas where frost is not a hazard, citrus and avocados can be grown on these soils. Irrigated areas are suited to truck crops, specialty crops, row crops, and forage crops. The soils are also suited to dryland grain and forage.

Leveling can be done on these soils without exposing unfavorable material. Returning all crop residues to the soils improves the content of organic matter and helps to reduce the hazard of erosion. In places infrequent floods occur along streams. The hazard of flooding does not, however, alter the choice of crops or affect normal tillage. These soils require more frequent irrigation than the soils in capability unit I–1 (19) irrigated, and the water should be applied in smaller amounts.

Capability unit IIs–8 (19) irrigated

In this unit are very deep to moderately deep, moderately well drained and well drained sandy loams and loams in the Arlington, Buchenau, and Exeter series. These soils have a hardpan at a depth between 35 and 54 inches. They occur in basins and on alluvial fans. In areas that are not irrigated, the soils are moderately well drained and well drained. Under irrigation, however, a perched water table is likely to develop and the soils may be slightly affected by salts and alkali. Slopes range from 0 to 2 percent.

Available water capacity is 5 to 8 inches. Fertility is moderate to high. The hazard of erosion is slight on these nearly level to gently sloping soils.

The soils in this unit are used for truck crops and alfalfa. Air drainage is poor, and citrus and other tree crops therefore are not grown. Small grains are the only dryfarmed crops.

When land leveling is done on these soils, only shallow cuts should be made to avoid exposing the hardpan. If irrigation water of poor quality is used and leaching is inadequate, an increase in soluble salts occurs. Also, if the soils are overirrigated, a perched water table is likely to form. In addition, a tillage pan is likely to develop if the soils are worked when too wet. Returning all organic matter to the soils improves soil fertility, structure, and tilth.

Capability unit IIIe–1 (19) irrigated

In this unit are moderately deep and very deep, somewhat excessively drained to moderately well drained soils on low hills, terraces, and alluvial fans. These soils are in the Arbuckle, Arlington, Buchenau, Cajalco, Fallbrook, Garretson, Greenfield, Hanford, Hilmar, Honcut, Las Posas, Ramona, San Emigdio, Vista, and Wyman series. The surface layer ranges from loamy very fine sand and coarse sandy loam to silt loam. Slopes generally are 0 to 15 percent, but in places they are 2 to 15 percent. Some of these soils are gravelly, and many of the soils are eroded or severely eroded.

The available water capacity ranges from 3.5 to 11.0 inches. The material underlying the soils in this unit is variable in composition, but most of it is relatively permeable. In a few of the soils a hardpan or rock is at a depth between 20 and 60 inches or more. The hazard of erosion is moderately high. The slopes make use of farm machinery for tillage difficult.

Most crops commonly grown in the Area can be grown successfully on these soils. Areas not irrigated are used for small grains and for some forage crops. Air drainage is good, and citrus and avocados can be grown and only minimum protection from frost is needed. Farming across the slope or on the contour are ways to slow runoff and reduce erosion. In places diversions or terraces that have suitable outlets are needed on long slopes to catch runoff water and safely carry it away. Cover crops can be grown in orchards to help reduce erosion.

Capability unit IIIe–1 (20) irrigated

In this unit are very deep, well-drained sandy loams and fine sandy loams of the Calpine and Oak Glen series. Slopes range from 2 to 15 percent. Calpine sandy loam is eroded, and some of the soils are gravelly.

Permeability in this soil is moderately rapid. Available water capacity is 6.0 to 9.0 inches. Roots and water penetrate these soils readily. These soils occur in areas where precipitation ranges from 10 to 16 inches or where water is available for irrigation.

These soils are suited to grain crops, forage crops, truck crops, and deciduous orchards. The growing season, however, is shorter than for soils in capability unit IIIe–1 (19). If water supplies can be developed, supplemental irrigation is used. Cultivating on the contour or across the slope and use of stubble mulch and cover crops help to control runoff and reduce erosion.

Capability unit IIIe–3 (19) irrigated

In this unit are well-drained fine sandy loams to loams of the Madera and Perkins series. These soils have a slowly to very slowly permeable subsoil of gravelly heavy clay loam or clay. Many roots of perennial plants and some roots of annual plants can penetrate the upper clayey horizons of the subsoil, but few roots can penetrate to a depth of over 4 feet. Slopes range from 2 to 8 percent. These soils are eroded in places.

The hazard of erosion is moderate on all of these soils,

but the gently sloping to moderately sloping soils are more erodible than the nearly level ones. The available water capacity is moderate where the subsoil is clay loam, and low where the subsoil is clay. Available water capacity ranges from 4.0 to 10.5 inches.

Under good management these soils are suited to citrus. Air drainage is good, and the hazard of frost is low in most places. Specialty crops and truck crops are also grown under irrigation, though they require intensive management and fertilization. Small grains and forage crops are the only dryland crops.

When land leveling is done on these soils, only shallow cuts should be made to avoid exposing the subsoil. If irrigation water of poor quality is used and leaching is inadequate, an increase in harmful salts occurs. Also, if the soils are overirrigated, a perched water table is likely to form. Planting crops on the contour or across the slope helps to control runoff and reduce erosion.

Capability unit IIIe-4 (19) irrigated

Delhi fine sand, 2 to 15 percent slopes, wind-eroded, is the only soil in this unit. It is very deep and is somewhat excessively drained.

Permeability is rapid in this soil. The soil is stratified in places, but the texture of the strata is relatively coarse and sandy. Available water capacity is 4.5 to 6.5 inches. Water erosion is not a hazard, but the hazards of wind erosion and damage to plants are high.

Most of this soil has been cultivated at some time, but some areas are now idle. Grapes and citrus are the main crops. Citrus is grown under irrigation, and grapevines receive supplemental irrigation. The amount of irrigation depends upon variations in annual rainfall. Dryfarmed small grains have been grown, but results were unsatisfactory in about half of the years.

Growing cover crops or keeping a cover of mulch on the surface provides protection from wind erosion. Applications of irrigation water and of fertilizer need to be light and frequent. Overirrigation wastes water and leaches nutrients from the soil.

Capability unit IIIe-5 (19) irrigated

In this unit are moderately deep to very deep, well-drained clays and gravelly clays of the Altamont, Auld, Bosanko, and Porterville series. These soils are on low hills, ridge crests, and sloping terraces. The Auld and Altamont soils are about 20 to 60 inches deep to decomposing gabbro and sandstone, and the Porterville soils are 24 to 42 inches deep to hard sediment that is calcareous in many places. Slopes range from 2 to 15 percent.

Permeability is slow to moderately slow in these soils. Roots penetrate these soils readily. Available water capacity is 3.5 to 7.5 inches. The hazard of erosion is moderate.

Most crops grown in the Area can be grown on these soils. Air drainage is good, and such frost-sensitive crops as citrus can be grown in many places. Avocados are poorly suited because of the slow permeability and fine texture of the soils. These soils are also suited to many specialty crops. If vegetables are grown on these soils, however, careful management is required because of the slopes.

Minor land shaping can be done on these soils. Deep cuts should be avoided, however, because in places cut areas expose sandstone or strongly calcareous sediment that are difficult to manage. Returning crop residues or other sources of organic matter to the soil improves the structure, tilth, and water intake. Cultivating across the slope reduces the hazard of erosion.

Capability unit IIIe-6 (19) irrigated

Soils in this unit are slightly saline-alkali and moderately saline-alkali. They are moderately well drained, moderately deep to very deep fine sandy loams and loams in the Buchenau and Grangeville series. These Buchenau soils are 24 to 52 inches deep to a hardpan, and the Grangeville soils are more than 60 inches deep. Slopes range from 2 to 15 percent.

Permeability is moderately rapid to moderately slow in these soils. The hardpan of the Buchenau soils is very slowly permeable. Available water capacity is 3.75 to 10.0 inches. The hazard of erosion is slight to moderate.

The soils in this unit are suited to those crops that can tolerate moderate amounts of salts and alkali. Small grains and annual pasture are the only suitable crops for areas not irrigated.

Cultivating across the slope or on the contour helps to slow runoff and to reduce the hazard of erosion. Growing cover crops or keeping stubble on the areas as a mulch also reduces erosion. Use of soil amendments may be beneficial, but leaching is difficult because of the slopes. Only shallow cuts should be made in these soils to keep from exposing the more saline-alkali subsoil.

Capability unit IIIe-8 (19) irrigated

Soils of this unit are moderately deep and deep, and moderately well drained and well drained. They are in the Arlington, Buren, Domino, Escondido, Exeter, Greenfield, Monserate, Vallecitos variant, and Ysidora series. The surface layer is sandy loam to loam, and it is gravelly in some places. The subsoil ranges from sandy loam to heavy clay loam. These soils are 19 to 50 inches deep to bedrock or to a very slowly permable hardpan. Some of these soils are eroded. Slopes range from 0 to 8 percent.

Permeability is moderate to slow in these soils. These soils are moderately fertile, and the available water capacity is 3.75 to 8.0 inches. The depth that roots can penetrate is limited by bedrock or by the hardpan. No moisture is available to plants from the bedrock or from the hardpan.

These soils occupy low terraces and ridge crests on low hills and in small and large valley fills that are high enough so that air drainage is good. Consequently, the areas provide nearly frost-free growing conditions. The soils are fairly well suited to tree crops. Their location favors the growing of citrus and avocados, but these crops and other fruit and nut crops are not commonly grown. Off-season vegetables and tender specialty crops are grown, but forage legumes are seldom grown. Small grains are the chief dryfarmed crops.

The hardpan or brittle pan in some of the soils can be broken by the deep ripping. Drainage then is improved in these soils, and roots are able to penetrate to a greater depth. Use of land smoothing is limited, especially on those soils that are shallow to bedrock. In some irrigated areas tile drains are needed for draining small draws and other wet spots that are likely to develop. Careful management of irrigation water is needed to keep a perched water table from forming.

Capability unit IIIw-0 (19) irrigated

Dello loamy fine sand, gravelly substratum, 0 to 2 percent slopes, is the only soil in this unit. It is moderately deep to deep and is somewhat poorly drained. Gravelly coarse sand is at a depth of 24 to 42 inches. The water table generally is at a depth of more than 36 inches.

Permeability is rapid in this soil. The available water capacity is 3.75 to 5.0 inches.

This soil is suited to irrigated pasture, alfalfa, small grains, and truck crops. When land leveling is done, only shallow cuts should be made to avoid exposing the unfavorable gravelly coarse sand. Where suitable outlets are available, tile drains or ditches are required to lower the water table and keep it below the root zone. Growing a protective cover of plants provides protection from wind erosion. Irrigation water needs to be applied fairly frequently and in small amounts.

Capability unit IIIw-4 (19) irrigated

Soils in this unit are nearly level to gently sloping and are somewhat poorly drained. They are in the Dello series. Their surface layer is loamy sand or loamy fine sand. These soils are on flood plains. Slopes range from 0 to 5 percent.

Permeability is moderately rapid in these soils. Available water capacity is 4.5 to 7.0 inches. The water table is at a depth below 36 inches.

These soils are suited to irrigated truck crops and field crops. Tree crops are not well suited because of the high water table. Tile drains or ditches are needed to lower the water table. Applying irrigation water in small amounts and fairly frequently avoids building up the water table. Returning all crop residues to the soils increases the content of organic matter and improves soil structure and tilth.

Capability unit IIIw-5 (19) irrigated

Willows silty clay is the only soil in this unit. It is a very deep, poorly drained, slowly permeable soil. This soil is in basins at fairly low elevations. Slopes range from 0 to 2 percent.

Permeability is slow in the subsoil. Drainage is poor, but the water table can be maintained at a depth below 3 feet fairly easily. The soil is over 5 feet deep, but root penetration is reduced by the high water table and clay texture. The available water capacity is 8 to 10 inches. Erosion is not a hazard. In places this soil is stratified, and permeability of the major strata is slow. Salts are present in places, but sufficient amounts can be removed so that crops that are moderately salt tolerant to very tolerant can be grown.

This soil is not suitable for tree crops. Alfalfa is fairly well suited, but it is generally not planted other than in a cropping system for soil conditioning purposes. Land leveling can be done on these soils without exposing unfavorable subsoil material. A tillage pan is not likely to form. Drainage ditches, supplemented in places by sump-lift outlets, are needed to make satisfactory use of these soils. Returning all crop residues and other organic matter to the soil increases the infiltration rate and improves structure and tilth.

Capability unit IIIw-6 (19) irrigated

Soils in this unit are very deep, somewhat poorly drained and poorly drained loamy fine sands, fine sandy loams, and silty clays. They are in the Dello, Grangeville, and Willows series. These soils are moderately affected by salts and alkali. They are more than 60 inches deep or have thin lenses cemented by lime and silica at a depth of 36 to 48 inches. Slopes range from less than 2 to 5 percent.

In places a water table is at a depth of 3 to 5 feet. The available water capacity is 5.0 to 10.0 inches. Erosion is not a hazard.

These soils are suited to forage crops, to row crops, and to field crops that can tolerate moderate amounts of salts and alkali. Tile drains or ditches are needed to lower the water table. Where drains are installed, the soil should be leached of salts by applying excess irrigation water. Such soil amendments as gypsum help to reduce the amount of sodium salts. If these soils are cultivated when moist, a tillage pan is likely to form.

Capability unit IIIs-0 (19) irrigated

Soils in this unit are moderately deep to deep, moderately well drained to excessively drained sandy loams and coarse sandy loams. They are underlain by coarse sand and gravel and are in the Cortina, Grangeville, and Hanford series. These soils formed in recent alluvium and lack clay accumulations. Some of these soils are eroded. Slopes range from 0 to 8 percent.

Roots penetrate to a depth of 20 to 42 inches. Permeability is rapid to very rapid. The available water capacity is 3.75 to 6.5 inches. Some moisture is available to plants from the underlying coarse material, but it is not sufficient for much plant growth.

These soils occur on flood plains. They are subject to stream cutting and detrimental deposition in places.

Walnuts and alfalfa are not suited to these soils. Under special management, these soils are suited to row crops and truck crops. Air drainage is adequate in most valleys for citrus to be grown if some protection from frost is provided.

When land leveling is done on these soils, only shallow cuts should be made to avoid exposing the coarse-textured substratum. A tillage pan is likely to develop in orchards. Because of the low available water capacity, irrigation water should be applied frequently and in small amounts to avoid loss of water and leaching of plant nutrients.

Capability unit IIIs-3 (19) irrigated

Madera fine sandy loam, 0 to 2 percent slopes, is the only soil in this unit. It is moderately deep and is moderately well drained. It has a clay subsoil and hardpan that severely restrict penetration of roots and water, though perennial plants obtain moisture from the subsoil in some places. Depth to clay subsoil ranges from 18 to 36 inches.

Permeability is very slow in this soil. Available water capacity is 4.0 to 5.0 inches. Erosion is not a hazard.

This soil generally is on low terraces where air drainage is good. In places where frost is not a hazard, citrus and off-season truck crops and specialty crops that are sensitive to frost can be grown. Avocados are poorly suited because of the very slowly permeable subsoil. In dry-farmed areas cropping is largely limited to small grains.

If irrigation water of poor quality is used and leaching is inadequate, an increase in soluble salts occurs. Natural rainfall is only moderately effective in reducing the salt content of the soil. When land leveling is done on these soils, only shallow cuts should be made to avoid exposing unfavorable material. If these soils are overirrigated, a perched water table is likely to form.

Capability unit IIIs-4 (19) irrigated

Soils in this unit are very deep and are somewhat excessively drained and excessively drained. They are in the Cortina, Gorgonio, and Metz series. Texture throughout the profile ranges from loamy sand to gravelly sandy loam. Most of the soils formed in recent alluvium, but a few formed in material deposited by wind. In some places the soils are stratified, but all strata are coarse textured or are very gravelly. Slopes range from 0 to 15 percent.

Permeability of these soils is moderately rapid to very rapid. Available water capacity is 3.75 to 7.5 inches. The hazard of water erosion is slight. If large areas are left without cover, wind erosion is a slight hazard. Roots readily penetrate these soils to a depth of 5 feet or more. These soils are not so uniform in particle size as the soils in capability unit IIIe-1 (19) irrigated and are exposed to stronger and more persistent winds, but otherwise they are similar.

The low available water capacity and coarse texture are the main factors limiting use of these soils. Most cropped areas are irrigated, and grapes, citrus, some specialty crops, and alfalfa are grown. Dryfarmed areas are used mainly for small grains.

Returning crop residues or other sources of organic matter to the soil improves tilth and structure. Applying irrigation water according to the needs of the crop avoids the wasting of water and the leaching of plant nutrients.

Capability unit IIIs-4 (20) irrigated

The soils in this unit are very deep, excessively drained loamy sands and sandy loams in the Mottsville series. These soils formed in recent alluvium. Slopes range from 2 to 15 percent.

Permeability is rapid. The available water capacity is 3.75 to 7.5 inches. The hazard of erosion is slight to moderate.

These soils are either irrigated or occur in an area where rainfall ranges from 16 to 25 inches. They are suited to irrigated apples, peaches, alfalfa seed, and potatoes. Applying irrigation water in accordance with the needs of the crop avoids wasting water and leaching of plant nutrients from the soil. Returning crop residues to the soils helps to reduce erosion and to maintain soil fertility and tilth. Cultivating across the slope or on the contour also helps to reduce the hazard of erosion.

Capability unit IIIs-6 (19) irrigated

Soils in this unit are moderately deep to very deep, well drained and moderately well drained loamy fine sands to silt loams. These soils contain moderate amounts of salts and alkali. They are in the Domino, Exeter, Grangeville, Traver, and Waukena series. Because of limited drainage outlets and the cost and supply of water, full reclamation of these soils is not feasible and crops that are sensitive to salts and alkali cannot be grown. Soil depth ranges from 20 to more than 60 inches. The shallower soils are underlain by a hardpan. Slopes range from 0 to 5 percent.

Permeability is moderate to slow in the subsoil and very slow in the hardpan, where present. The available water capacity is about 3.75 to 10 inches. In places salt considerably reduces actual available water. The hazard of erosion is slight. Wind, however, causes some damage to plants and slight erosion and deposition.

In places the use of soil amendments, land leveling, and leaching are needed. After initial land improvement is completed, irrigation must be controlled so that salts move downward through the soils. If crops are overirrigated, a perched water table is likely to occur. Tile drainage also is required in places to keep a high water table from developing. Returning all cover crops, crop residues, and other sources of organic matter to the soil improves fertility, structure, and tilth.

Capability unit IIIs-8 (19) irrigated

In this unit are moderately deep, moderately well drained and well drained sandy loams and silt loams. These soils are in the Domino and Exeter series. They are 20 to 42 inches deep to a hardpan. These soils are in basins and on alluvial fans. Slopes range from 0 to 2 percent.

Permeability above the hardpan is moderate to slow. The depth that roots can penetrate is limited by the hardpan, and no moisture is available to plants in the hardpan. Only a moderate amount of clay occurs in the subsoil. Available water capacity is 3.75 to 7.0 inches. Fertility is moderately high. The hazard of erosion is slight.

Alfalfa and truck crops are grown on these soils, but fruit and nut crops are not commonly grown. In dryfarmed areas, the only suitable crops are small grains and annual pasture plants. Alfalfa, other forage crops, row crops, and field crops that can tolerate moderate amounts of salts and alkali are suited.

If crops are overirrigated, a perched water table is likely to occur. Returning all cover crops, crop residues, and other sources of organic matter to the soil improves fertility, structure, and tilth.

Capability unit IVe-1 (19) irrigated

Soils in this unit are shallow to very deep, well-drained and somewhat excessively drained sandy loams to loams. They are in the Arbuckle, Arlington, Cajalco, Cieneba, Fallbrook, Greenfield, Las Posas, Ramona, San Timoteo, and Vista series. These soils are 10 to 54 inches deep to weathered permeable bedrock, or to a weakly cemented hardpan and on sloping terraces they are more than 60 inches deep. Some of these soils are gravelly, and many of them are eroded or severely eroded. Slopes range from 5 to 25 percent.

Permeability is rapid to slow in the subsoil. Available water capacity is 2.0 to 10.0 inches. Most of the soils are moderately fertile. Roots penetrate these soils readily, and in places moisture and a few roots enter the underlying parent material.

These soils generally occur in the foothills where air drainage is favorable. They are suited to all crops adapted to the climate. In areas where irrigation water is available, large areas are planted to citrus and to avocados. In dryfarmed areas small grains are the only crops that can be grown.

Cultivating across the slope or on the contour are ways

to control runoff and reduce erosion. Also, diversions or terraces that have adequate outlets need to be run across the slope to slow runoff water and reduce erosion. In orchards, cover crops are needed for erosion control. Leaving a stubble as a mulch in grainfields helps to slow runoff, increase infiltration, and reduce erosion. Sprinklers are the most efficient method of irrigation on these soils.

Capability unit IVe-1 (20) irrigated

Oak Glen gravelly sandy loam, 15 to 25 percent slopes, is the only soil in this unit. It is very deep and is well drained. Roots and water penetrate this soil readily.

The available water capacity is 4.5 to 7.5 inches. This soil is in areas where precipitation ranges from 10 to 16 inches or where water for irrigation is available.

This soil is suited to small grains, forage crops, and deciduous orchards. Erosion is the principal hazard if this soil is cultivated. Supplemental irrigation is used where supplies of water can be obtained, and sprinklers are the most efficient method of irrigation. The short growing season limits the kind of crops that can be grown.

Cultivating across the slope and building terraces and diversions that have adequate outlets across long slopes help to slow runoff and reduce erosion. The use of stubble mulch also aids in reducing erosion.

Capability unit IVe-3 (19) irrigated

In this unit are fine sandy loams to loams in the Bonsall, Madera, Perkins, Placentia, and Yokohl series. These soils are gravelly in places. They have a subsoil of gravelly clay loam or clay that is slowly to very slowly permeable. The subsoil is at a depth of 10 inches in some of the Madera and Placentia soils. Other soils have a subsoil that is more than 60 inches deep. These soils are on terraces and uplands. Slopes generally range from 2 to 15 percent, but they are 0 to 5 percent in places. Many of these soils are eroded.

Permeability is slow to very slow in these soils. Available water capacity is 2.0 to 7.5 inches. In most of the soils, fertility is low. The hazard of erosion is high to very high. The roots of some perennial plants and of a few annual plants penetrate only a short distance into the clay subsoil, but they penetrate more readily into the gravelly clay loam subsoil.

If these soils are irrigated and water that has a high salt content is applied, the salts are likely to accumulate and adversely affect crops that are salt sensitive. Some citrus trees are planted on these soils, but they generally are less vigorous and are smaller than trees planted on soils that have a deeper, more permeable subsoil. Because of the slowly to very slowly permeable subsoil, avocados and other tree crops are not well suited to these soils. Suitable dryfarmed crops are small grains and forage crops.

Shallow tile drains are needed in places in irrigated groves to intercept seepage or to help remove a perched water table. Farming on the contour, use of stubble mulch, and use of cover crops help to slow runoff and to reduce erosion. Sprinklers are the best to use for irrigation.

Capability unit IVe-5 (19) irrigated

In this unit are moderately deep to very deep, well-drained clays. These soils are in the Altamont and Porterville series. Some of these soils are gravelly, and some are cobbly. Depth to sandstone or calcareous marl is 20 to 42 inches. The substratum is calcareous. Slopes range from 2 to 35 percent, and many of the soils are eroded.

Permeability is slow in these soils. The hazard of erosion is moderate to high, especially in areas used for dryfarmed grain.

These soils are used for dryfarmed grain and annual pasture and for citrus and irrigated alfalfa. Air drainage is favorable. Permeability is adequate under nearly all conditions of precipitation and irrigation except for the most sensitive crops such as avocados.

Orchards should be planted on the contour to slow runoff and reduce erosion, or cover crops should be grown in the orchards. Turning under green-manure crops or cover crops helps to improve tilth, soil structure, and water penetration. Sprinklers are the most efficient method of irrigation to use on these soils.

Capability unit IVe-8 (19) irrigated

Soils in this unit are moderately deep to deep, well drained and moderately well drained sandy loam to loam. These soils are in the Arlington, Buren, Escondido, Greenfield, Monserate, Ramona, and Ysidora series. Also in this unit is a variant from the Vallecitos series. Some of these soils are gravelly. These soils are 19 to 50 inches deep to very slowly permeable bedrock or a hardpan. Slopes range from 2 to 25 percent, but they are dominantly 8 to 15 percent. Most of these soils are eroded.

Permeability is moderate to very slow in the subsoil. The bedrock or hardpan limits root penetration and may cause buildup of excess moisture for short periods after irrigation or a heavy rain. The hazard of erosion is high.

These soils generally are in the foothills where air drainage is favorable. In areas where irrigation water is available small areas are planted to citrus. In dryfarmed areas small grain is grown. Avocados and other crops sensitive to impaired drainage are not suited. Cultivating across the slope or on the contour helps to slow runoff and to reduce erosion. The use of stubble mulch helps reduce erosion and also increases infiltration. Sprinklers are the best to use for irrigation.

Capability unit IVec-1 (20) dryland

In this unit are moderately deep to very deep, well-drained to somewhat excessively drained loamy sands to loams. These soils are in the Anza, Bull Trail, Calpine, Crouch, Hanford, and Oak Glen series. They occur in areas of low effective rainfall. Slopes range from 0 to 25 percent in most places, but they range from 0 to 2 percent in some areas of Anza loam. Most areas are eroded.

These soils have only slight restrictions that affect penetration of roots and water. In places there is a slight to moderate increase in amount of clay in the subsoil. Except in the Bull Trail and Crouch soils, which are, respectively, 20 to more than 60 inches deep to a hardpan and 22 to 46 inches deep to weathered granite, the effective soil depth is more than 60 inches. Permeability is moderately rapid to moderately slow. Annual precipitation ranges from 7 to 10 inches. Available water capacity ranges from 2.0 to 10.0 inches.

The soils of this unit are used for rye grown for grain, and are also used for forage crops. Water is not available for irrigation, and growth of crops is erratic because of

local variations in rainfall. Grain crops should be grown only every other year. Leaving the stubble in the fields as a mulch helps to increase infiltration. Loss of moisture stored in the soils can be reduced by controlling weeds.

Capability unit IVw–0 (19) irrigated

Dello loamy sand, gravelly substratum, 0 to 5 percent slopes, is the only soil in this unit. It is shallow to moderately deep over gravelly coarse sand and is somewhat poorly drained. A seasonal water table occurs at a depth of more than 36 inches. Depth to gravelly coarse sand ranges from 15 to 24 inches.

Permeability is rapid in this soil. Available water capacity is 2.0 to 3.5 inches.

Land smoothing or leveling can be done on this soil without exposing unfavorable material. Where suitable outlets are available, tile drains or open drains can be used to help lower the water table. Keeping a protective cover of plants on the surface during the season of high winds helps to reduce the hazard of wind erosion. Frequent and light applications of irrigation water and fertilizer are needed to avoid loss of water and plant nutrients and to keep the water table from rising.

Capability unit IVw–6 (19) irrigated

In this unit are moderately deep to very deep, poorly drained to somewhat poorly drained fine sandy loams, silt loams, and silty clays. These soils are in the Chino, Domino, Grangeville, and Willows series. They are moderately saline-alkali to strongly saline-alkali. Most of these soils are more than 60 inches deep. The Domino and some Willows soils have a hardpan at a depth of 20 to 48 inches. Slopes are dominantly less than 2 percent, but they range from 0 to 5 percent.

Permeability is moderately rapid to slow in these soils. In places the water table is within 1½ to 3 feet of the surface. Under irrigation a water table forms and wet spots develop in places. The available water capacity is 4.0 to 9.5 inches.

These soils occur mostly in basins and on flat alluvial plains, where air drainage is poor. They are suited to hardy field crops and to pasture crops. Artificial drainage is needed to lower the water table. In addition to improved drainage, leaching and large amounts of gypsum or sulfur are needed to remove excess salts and alkali and to maintain a salt balance favorable for crops. These improvement practices are especially difficult to perform on these soils.

Capability unit IVs–0 (19) irrigated

Soils in this unit are shallow to deep, excessively drained to somewhat excessively drained loamy sands to sandy loams. They are in the Cortina, Metz, and Tujunga series. These soils are gravelly in places. They are 10 to 42 inches deep to very coarse sand or gravelly loamy coarse sand. These soils formed in recent alluvium, on flood plains. Slopes range from 0 to 5 percent.

Permeability is rapid in these soils. The available water capacity is 2.0 to 4.0 inches. Fertility is low. Erosion is not a hazard.

These soils are better suited to shallow-rooted, irrigated specialty crops than to other crops. Citrus, other fruit crops, and deep-rooted crops are poorly suited. The low available water capacity and rapid permeability make it necessary to apply irrigation water frequently and in small amounts. Overirrigation should be avoided because it leaches plant nutrients from the soils. When land leveling is done on these soils, only shallow cuts should be made to avoid exposing unfavorable material. Returning crop residues to the soils improves soil structure and fertility.

Capability unit IVs–4 (19) irrigated

Soils in this unit are very deep, somewhat excessively drained and excessively drained loamy sands to sandy loams. They are in the Cortina, Gorgonio, and Tujunga series. In places these soils are cobbly. Slopes range from 0 to 15 percent.

Permeability is rapid to very rapid in these soils. The available water capacity is 3.0 to 5.0 inches. Fertility is low.

These soils are on fans, and air drainage is favorable in places. Where irrigation water is available, apricots, almonds, and citrus are grown. Walnuts also are grown in a few places. Dryfarmed areas are used largely for small grains, pasture, and range.

If these soils are clean cultivated, erosion is a hazard. In most places the stones are removed from the surface to make leveling or smoothing easier, but the soil is not otherwise disturbed. Cover crops are grown continuously in irrigated orchards to protect the soils from erosion, or volunteer crops are left to provide cover. Cultivating across the slope helps to slow runoff and reduce erosion. Returning crop residues to the soils improves fertility and structure. Sprinklers generally are better to use for irrigating these soils than other methods, though in places the more gently sloping soils can be furrow irrigated.

Capability unit IVs–4 (20) irrigated

Mottsville loamy sand, 8 to 15 percent slopes, is the only soil in this unit. It is a very deep, excessively drained soil that formed on alluvium and is stratified in places. Roots and water readily penetrate this soil.

Permeability is rapid in this soil. Available water capacity is 3.75 to 5.0 inches. This soil occurs in areas where precipitation provides 10 to 16 inches of water for irrigation.

This soil is moderately well suited to small grains, forage crops, and deciduous orchards. If water supplies can be developed, supplemental irrigation is used. Returning all crop residues to the soil improves soil structure and fertility. Cultivating across the slope helps to control runoff and reduce erosion. Sprinklers are well suited to use for irrigating this soil.

Capability unit IVs–6 (19) irrigated

Soils in this unit are very deep, somewhat poorly drained to moderately well drained fine sandy loams and silt loams. They are in the Chino, Traver, and Waukena series. These soils are saline-alkali to strongly saline-alkali. Slopes range from 0 to 2 percent. Some areas are eroded.

Permeability is moderately slow to slow in these soils. The available water capacity is 7.0 to 11.0 inches. Erosion is not a hazard.

These soils have a high percentage of adsorbed sodium and an excess of soluble salts. In places a perched water table occurs for short periods because of the unfavorable

permeability of the subsoil. Productivity of these soils is moderately high if the soils are leached of salts and if the sodium is replaced by calcium.

These soils occur mostly in basins and on the lower ends of alluvial fans where air drainage is poor. They are suited to vegetables, field crops, and forage crops that tolerate frost.

Leaching is needed to reclaim these soils and to maintain a salt balance favorable for crops. In places artificial drainage also is needed to accomplish the necessary leaching. Large amounts of gypsum or sulfur should be added to the soils that have a high sodium content. Reclamation of these soils is extremely difficult.

Capability unit IVsc-4 (20) dryland

Soils in this unit are very deep, well-drained to excessively drained loamy sands to sandy loams. They are in the Hanford and Mottsville series. These soils have only slight restrictions that affect penetration of roots and water. Slopes range from 0 to 15 percent.

Permeability is moderately rapid to rapid in these soils. The available water capacity is 3.75 to 7.5 inches. These soils occur in areas where precipitation provides only 7 to 10 inches of available moisture and no irrigation water is available.

Under intensive management that includes practices for conserving moisture, these soils are suited to rye grown for grain and to forage crops. Except in years of favorable moisture, growth of crops is poor.

Leaving stubble on the surface as a mulch and eradicating weeds are ways of conserving moisture. Cultivating across the slope slows runoff and thus reduces erosion.

Capability unit VIe-1 (19) dryland

Soils in this unit are very deep, well-drained coarse sandy loams to loams. They are in the Arbuckle, Cajalco, Cieneba, Fallbrook, Greenfield, Las Posas, Ramona, San Timoteo, Soper, and Vista series. Also in this unit is a variant of the Vallecitos series. These soils are 10 to more than 60 inches deep. Some of the soils are on permeable bedrock. Slopes range from 2 to 50 percent, but they are dominantly 8 to 35 percent. All of these soils are eroded or are severely eroded.

Permeability is moderately rapid to moderately slow in these soils. The soils that lack a distinct subsoil or an accumulation of clay are on permeable bedrock. The soils that have a slight to moderate increase of clay in the subsoil and slower permeability generally are on terraces or on bedrock. Available water capacity of the soils is 2.0 to 10.0 inches.

Steep slopes and the hazard of further erosion make these soils unsuitable for cultivated crops. Small areas of crops, such as citrus, that do not require cultivation can be grown under careful management that includes measures for control of erosion. Most areas of these soils are better suited to range and dryland pasture than to other uses.

Range on these soils should not be overgrazed. Brush control, seeding, and fertilizing are feasible. A short stubble of the range plants should be kept on these soils to help reduce erosion and to keep undesirable plants from invading.

Capability unit VIe-1 (20) dryland

Soils of this unit are moderately deep to deep, well-drained fine sandy loams and sandy loams. They are in the Crafton and Crouch series. Slopes range from 8 to 35 percent. These soils are eroded.

Permeability in these soils is moderately rapid to moderately slow. These soils are underlain by weathered bedrock or a weakly cemented hardpan at a depth of 20 to 46 inches. Precipitation ranges from 10 to 16 inches. Available water capacity is 3.0 to 5.0 inches.

These soils are suited to pasture and range. The slope and hazard of erosion are the principal limiting factors affecting their use. Brush control, applying fertilizer, and seeding pasture are feasible. Enough cover must be left on the surface to protect the soils from erosion.

Capability unit VIe-5 (19) dryland

Soils in this unit are deep to moderately deep, well-drained clays of the Auld and Altamont series that are cobbly in places. These soils are about 20 to 60 inches deep to weakly consolidated sandstone or igneous rocks. Slopes range from 8 to 50 percent.

Roots readily penetrate these soils. Fertility is high, and the available water capacity is 3.0 to 5.0 inches. The hazard of erosion is moderate.

These soils are better suited to range and pasture than to other uses. Pasture can be improved by fertilizing, by seeding, and by controlling the brush. Air drainage on these soils is favorable, and in places citrus is grown under intensive management. Dryfarmed grain is also grown in places where these soils are intermingled with similar soils of capability units IIIe-5 (19) and IVe-5 (19). Protecting the soils from overgrazing helps to control erosion.

Capability unit VIe-7 (19) dryland

Soils in this unit are moderately well drained to excessively drained loamy fine sands to clay loams. They are in the Cajalco, Cieneba, Fallbrook, Gorgonio, Hanford, Las Posas, Murrieta, Placentia, Vista, and Yokohl series. Some of these soils are stony or cobbly, and in many places rocks crop out. The soil between the rock outcrops is about 10 to 36 inches deep. A few stony or cobbly soils are more than 60 inches deep. Some of the soils are 12 to 42 inches deep to a hardpan or to a layer of clay. The stones or cobblestones cover 0.1 to 3.0 percent of the surface and are 5 to 30 feet apart. Slopes range from 2 to 50 percent. Most of the soils are eroded.

Permeability is rapid to slow in all soils except the Placentia and Yokohl, which have a very slowly permeable subsoil. The available water capacity is 1.5 to 6.5 inches. The underlying rock or alluvium is sufficiently permeable in places for moisture and a few roots to penetrate.

Soils in this unit are used primarily for dryland pasture and range. The stones and rocks in the soils make cultivation impractical. A small amount of citrus and other orchard crops are grown under intensive management. Seeding can be done in the pastured areas and fertilizer can be applied. Some plant cover should be left on the soils to help prevent erosion.

Capability unit VIe-7 (20) dryland

Soils in this unit are moderately deep to very deep, somewhat excessively drained to well-drained sandy loams and coarse sandy loams. They are in the Bull Trail, Craf-

ton, Crouch, and Hanford series. Some of these soils are underlain by weathered bedrock at a depth of 20 to 60 inches; others formed in alluvium and are more than 60 inches deep. In places these soils are stony, rocky, or cobbly. Most of these soils are eroded or severely eroded. Slopes range from 2 to 50 percent.

Permeability is moderately rapid to moderately slow in these soils. Available water capacity is 1.5 to 5.0 inches. Precipitation ranges from 10 to 16 inches.

These soils are used only for annual pasture, range, wildlife, or recreation. Only limited pasture seeding, fertilizing, and brush control are feasible. The rocks and stones on the soils make tillage difficult. Seeding and fertilizing therefore are best accomplished by helicopter or by airplane.

Capability unit VIe–8 (19) dryland

Soils in this unit are shallow to deep, well drained and moderately well drained sandy loams to loams. They are in the Arlington, Buren, Escondido, Friant, Monserate, and Yokohl series. These soils are 10 to about 50 inches deep to slowly permeable or very slowly permeable bedrock or a hardpan, which roots cannot penetrate. Slopes range from 5 to 50 percent, but they are dominantly 8 to 50 percent. These soils are eroded or severely eroded.

Permeability of the subsoil ranges from moderately rapid to slow in all of these soils except the Yokohl, which has a very slowly permeable clay subsoil. Available water capacity is about 2.0 to 8.0 inches.

These soils generally are used for pasture or range. Where the climate is suitable, small areas are planted to citrus and other orchard crops. A high level of management is needed that includes practices for the control of erosion. Avocados and other crops sensitive to impaired drainage are not suited to these soils.

Brush control, pasture seeding, and fertilizing are feasible for improving pastures on these soils. Controlling grazing protects the soils from erosion and keeps undesirable plants from invading.

Capability unit VIec–4 (20) dryland

Sheephead fine sandy loam, 8 to 15 percent slopes, eroded, is the only soil in this unit. It is shallow and is excessively drained. Weathered bedrock is at a depth of 10 to 20 inches. Permeability is moderately rapid. The available water capacity ranges from 2.0 to 3.0 inches. Precipitation ranges from 7 to 10 inches annually.

This soil is suited to range and dryland pasture. Seeding and fertilizing improve the amount and quality of forage in years of favorable moisture. Overgrazing must be avoided to help control erosion.

Capability unit VIw–1 (20) dryland

This unit consists of Bishop silt loam and of the land type, Wet alluvial land. These soils are very deep, are nearly level, and are poorly drained. They occur in mountain meadows. Some areas are eroded, and some are affected by salts and alkali.

Roots and water penetrate these soils readily, even though in many places a seasonal water table is close to the surface. In most places the soil material is stratified, but texture and permeability of the stratified material differ little from those in the surface layer. Permeability is moderate to moderately slow. Available water capacity is 9 to 10 inches. The content of organic matter is high.

Most areas of these mapping units are drained by using closed or open drains. Productivity generally is greater, however, if the areas are kept in native meadow grasses. In many places stream entrenchment and gullying, which lower the water table and greatly reduce growth of forage plants, are the chief hazards to continued use. Protection from overgrazing therefore is needed.

Capability unit VIs–7 (20) dryland

Mottsville cobbly sandy loam, 8 to 25 percent slopes, eroded, is the only soil in this unit. It is very deep and is excessively drained. Permeability is rapid, and the available water capacity is 3.0 to 4.5 inches. The hazard of erosion is moderate.

This soil is suited to pasture, range, wildlife, and recreation. Limited seeding and fertilizing improve the amount and quality of forage in years of favorable rainfall.

Capability unit VIIe–1 (19) dryland

Soils in this unit are shallow to moderately deep, somewhat excessively drained to moderately well drained sandy loams to loams. They are in the Cieneba, Fallbrook, Friant, Gaviota, Las Posas, Lodo, Monserate, Soper, Temescal, Vallecitos, and Ysidora series. The land type, Terrace escarpments, also is in this unit. These soils are 8 to 36 inches deep. In places they are gravelly and are underlain by permeable to slowly permeable bedrock or a hardpan. Rock outcrops cover 2 to 10 percent of the surface in many areas. Slopes range from 8 to 50 percent, but they are dominantly 15 to 50 percent. These soils are eroded or severely eroded.

In places some soils have an increase in clay in the subsoil. It does not, however, limit penetration of roots or water. Permeability is rapid to moderately slow in all the soils except in the Ysidora, which have a very slowly permeable clay subsoil. The hazard of erosion is moderate to very high, and the natural fertility is relatively low. Available water capacity is 1.0 to 5.0 inches.

These soils are not suited to cultivation because of the slope, shallow depth, and high hazard of erosion. They are used mostly for range, for watershed, and as wildlife habitat. Protecting these soils from overgrazing and fire helps to reduce erosion. Seeding or fertilizing is not economically feasible on these soils.

Capability unit VIIe–1 (20) dryland

In this unit are shallow, excessively drained soils of the Bull Trail and Tollhouse series. These soils have a surface layer of sandy loam and are 10 to 20 inches deep to granodiorite. Permeability is moderately rapid. Available water capacity is 2.0 to 5.0 inches. Slopes range from 8 to 25 percent.

These soils are suited to wildlife, recreation, watershed, and range. Protecting the soils from fire and overgrazing helps to control erosion.

Capability unit VIIe–4 (20) dryland

Soils in this unit are shallow, somewhat excessively drained and excessively drained sandy loams. These soils are in the Sheephead and Tollhouse series. They have a thin surface layer of fine sandy loam and coarse sandy

loam that overlies weathered bedrock at a depth of 10 to 20 inches. Slopes range from 8 to 75 percent. These soils are eroded.

Permeability is moderately rapid to rapid in these soils. Available water capacity ranges from 0.5 to 2.0 inches. Rock outcrops cover 2 to 10 percent of the surface.

These soils are suited to watershed, wildlife, recreation, and range. Protecting the soils from fire and overgrazing helps to control erosion.

Capability unit VIIw-4 (19) dryland

Soils in this unit are very deep and are poorly drained to excessively drained. They are in the Cortina, Dello, Gorgonio, Hanford, Honcut, Metz, San Emigdio, Soboba, and Tujunga series. These soils are subject to frequent flooding by streams and to stream erosion, deposition, and channeling. Their surface layer is loamy sand to sandy loam. Many of these soils are gravelly, stony, or cobbly. Slopes range from 0 to 25 percent.

Permeability is moderately rapid to very rapid in these soils. Available water capacity is 1.5 to 8.0 inches.

In places these soils support a dense cover of plants that tolerate wetness. The vegetation on some other areas is not so dense, and still other areas are nearly barren. These soils are suited to range and recreation. Protecting the soils from overgrazing helps to control erosion. If protected from flooding, these soils are suited to most crops adapted to the Area, and they can be managed about the same as soils in classes I through IV.

Capability unit VIIw-4 (20) dryland

Mottsville cobbly loamy sand, 8 to 25 percent slopes, is the only soil in this unit. This soil is subject to frequent flooding by streams and to stream erosion and deposition of soil and debris in winter and spring. In places this soil supports a dense cover of riparian vegetation. The vegetation on some other areas is less dense, and still other areas are nearly barren.

Permeability is rapid, and drainage is excessive. Available water capacity ranges from 2.5 to 3.0 inches.

This soil is suited to range, wildlife, and recreation. Protection from overgrazing is needed.

Capability unit VIIs-4 (19) dryland

Soboba cobbly loamy sand, 2 to 25 percent slopes, is the only soil in this unit. It is a very deep, excessively drained soil on alluvial fans. The soil is cobbly to very cobbly loamy sand throughout.

Permeability is very rapid in this soil. The available water capacity is 2.5 to 3.5 inches. The hazard of erosion is moderate.

This soil is suited to range, recreation, and watershed. Providing protection from fire helps to reduce the erosion hazard. Because of the low water capacity and many coarse fragments in this soil, the response to seeding and fertilizing is not sufficient to justify the cost.

Capability unit VIIIe-1 (19, 20) dryland

The land types Badland, Gullied land, and Rough broken land make up this unit. The soil material in these land types is very shallow and gullied and is subject to very severe erosion. It ranges from sandy loam to clay loam in texture and generally is less than 10 inches deep to fairly soft underlying material. Slopes are steep to very steep.

Some areas of these land types are barren of vegetation. A plant cover is needed on the areas to keep large quantities of sand, silt, and debris from washing onto more productive areas.

These land types have little value for farming. They are used only for watershed, for recreation, and for wildlife. Protection from fire is needed to reduce the hazard of erosion.

Capability unit VIIIw-4 (19, 20) dryland

Only Riverwash is in this unit. It consists of very deep, very coarse, sandy, gravelly, or stony areas in stream channels. Frequent flooding by streams and deposition of soil material is likely. Riverwash is essentially barren. Slopes range from 0 to 8 percent.

This land type is not suitable for farming. It provides suitable sites for recreation and for wildlife. Some areas are also a source of sand and gravel for construction purposes.

Capability unit VIIIs-1 (19, 20) dryland

This unit consists of Gaviota rocky fine sandy loam, 25 to 75 percent slopes, severely eroded, and of the land type, Rock land. These mapping units are on rough mountainous areas that have a cover of brush. The soil material between the rocks is extremely rocky and is less than 15 inches deep to bedrock. The Gaviota soil is somewhat excessively drained and is moderately permeable. Available water capacity is less than 1.0 inch.

Areas of this capability unit are not suited to farming. They are used for watershed, for recreation, and as wildlife habitat. Providing protection from fire helps to reduce the erosion hazard.

Estimated Yields

This subsection gives estimated yields of the principal crops grown in the Western Riverside Area, explains the vegetative soil groups, and discusses some of the management practices used to obtain the yields given in tables 2 and 3. In table 2 are estimated yields for crops grown in the Southern California Coastal Plains, and in table 3 are estimated yields for crops grown in the Southern California Mountains. These estimates are based on observations made by soil scientists who surveyed the Area, on comparisons with similar soils, and on information furnished by farmers. They also are based on suggestions furnished by crop specialists in the Soil Conservation Service, the California Agricultural Experiment Station, and by the Federal Extension Service. Federal and county census records and crop data also were reviewed and considered.

Vegetative soil groups.—A vegetative soil group is a grouping of soils that have similar properties and qualities from the standpoint of plant adaptation and use. The grouping is used chiefly for determining the plants most suitable for conservation practices and production of forage when the major limiting soil feature or problem is known. The possibility of irrigation and such climatic factors as precipitation, maximum and minimum temperatures, and length of growing season are separate factors and are not covered here. The system is statewide,

and eight of the vegetative soil groups are recognized in the Western Riverside Area. The soils in each vegetative group can be determined by referring to the "Guide to Mapping Units" at the back of the survey. The groups are defined in the paragraphs that follow.

Group A—Choice of plants not limited by the soil: Soils are deep to very deep. The texture is moderately coarse to medium. Permeability is moderately rapid to moderately slow, drainage is moderately good to good, and available water capacity is at least 1.5 inches per foot of soil. Soils in this group may be slightly saline or are alkali. Typical soils in this group are in the Arbuckle, Greenfield, Hanford, and Oak Glen series.

Group B—Choice of plants limited by droughtiness and low fertility: Soils are deep to very deep. The surface layer is coarse textured to medium textured and is gravelly in places. The substratum is gravelly coarse sand in places. Permeability is rapid, drainage is excessive, and available water capacity is less than 1.5 inches per foot of soil. Typical soils in this group are in the Cortina, Metz, Mottsville, and Tujunga series.

Group C—Choice of plants limited by fine texture: Soils are deep to very deep. The texture is moderately fine to fine. Permeability is moderately slow to slow, and drainage is good. Typical soils in this group are in the Altamont, Auld, Bosanko, and Porterville series.

Group D—Choice of plants limited by subsoil permeability: Soils are shallow to moderately deep, moderately coarse textured to moderately fine textured, and moderately well drained. Subsoil is clay that is slowly or very slowly permeable. Typical soils in this group are in the Bonsall, Madera, Perkins, Placentia, and Yokohl series.

Group E—Choice of plants limited by wetness: Soils are deep to very deep. The texture is coarse to fine. Drainage is somewhat poor to very poor; in places salts and alkali are present. Soils are placed in vegetative groups according to their current drainage status. Bishop is a typical soil in this group.

Group F—Choice of plants limited by salts and alkali: Soils are moderately deep to very deep. The texture is coarse to fine. Drainage is somewhat poor to poor in places, and salts and alkali are moderate to strong. Typical soils in this group are in the Chino, Grangeville, Traver, Waukena, and Willows series.

Group G—Choice of plants limited by depth: Soils are shallow to moderately deep to hardpan, bedrock, or other unfractured dense material. Typical soils in this group are in the Arlington, Buren, Escondido, Friant, Monserate, and Ysidora series.

Group J—Choice of plants depends upon onsite investigation: Most of the soils or land types in this group are in the nonarable category. Typical soils in this group are in the Cieneba, Crafton, Gaviota, Lodo, Las Posas, Sheephead, Soper, and Temescal series. Miscellaneous land types in this group are Riverwash and Rock land.

Management practices.—Tables 2 and 3 give the yields of the principal crops grown in the Area under two levels of management, designated as A and B. The management levels are defined as follows:

A. Common, or average, management. That level of management most commonly used by farmers of the Area.
B. Optimum management. That level of management, actually applied or not, that experience, field trials, and research findings up to the present indicate would give the highest returns.

Several important limitations should be kept in mind when using the yield estimates in tables 2 and 3. First, the figures are estimates or predictions. Second, the figures are averages that may be expected over a period of years. In any given year, the yield may be considerably higher or lower than the average. The yield given in the "Wine grapes" column is an approximate average of sweet, dry, and special wine grape varieties. Yields vary from 1.5 tons per acre of special wine varieties to 12 tons per acre of some sweet wine varieties. Third, there is considerable variation within some soils. For example, the amount of salts and alkali in the soils varies from place to place, and this fact was considered in making the estimates. Fourth, except for frost hazard in relation to oranges, no allowance was made for variations in climate. In many parts of the Area, for example, the climate is not suitable for growing wine grapes, but yields of grapes were based upon the suitability of the soil and no allowance was made for variations in climate.

In addition variation in rainfall affects the yields of dryland crops in the Area on soils of the same or similar mapping units. In the San Gorgonio Pass area and south of Calimesa at an elevation of 2,000 to 4,000 feet, the barley yield is consistently higher than that in the rest of the Area. This higher yield may amount to more than 800 pounds per acre on the Hanford and Greenfield soils.

The information on yields and management practices provided in this part of the survey will be most useful immediately upon release of the survey. New developments in crop breeding, use of fertilizer, tillage, and control of insects and diseases will change some information on management. Newer and better practices can always be substituted, and the State and Federal farm advisory services can provide the latest information available.

The management commonly practiced for most crops grown in the survey area includes proper preparation of the seedbed and control of weeds, diseases, insects, and pests. The best adapted and most desirable varieties of crops are grown, and preparation of the seedbed, planting, harvesting, pruning, tillage, irrigation, and other management are done at the proper time and in the proper order. These practices will be more intense and exacting under the B level of management than under the A level.

Estimates of yields are of most use when the management practices under which such yields are produced are specified. Details of management for a particular yield can be obtained by locating the mapping unit and the level of management in table 2 or table 3, and its vegetative group in the "Guide to Mapping Units" at the end of this survey. For example, Arbuckle gravelly loam, 2 to 8 percent slopes (AlC), produces an estimated yield of 380 boxes of oranges per acre under the B level of management. This soil is in capability unit IIe-1 (19) and in vegetative soil group A. The combination of practices that will produce this yield is covered in the following discussion.

APRICOTS. Under the A level of management, apricots grown on soils in all suitable vegetative soil groups require a volunteer cover crop. These trees require 5.0 to 8.0 acre-inches of irrigation water applied on a fixed schedule

TABLE 2.—Estimated average acre yields of principal crops under two levels of

[Yields are shown for crops actually grown or suited to the soil. Absence of a figure indicates

Soil	Irrigated crops						
	Apricots		Peaches		Wine grapes		Alfalfa
	A	B	A	B	A	B	A
	Tons[1]	*Tons*[1]	*Lugs*[2]	*Lugs*[2]	*Tons*	*Tons*	*Tons*[3]
Altamont clay, 5 to 15 percent slopes							
Altamont clay, 15 to 25 percent slopes, eroded							
Arbuckle gravelly loam, 2 to 8 percent slopes	6	8					11
Arbuckle gravelly loam, 8 to 15 percent slopes	5	8					
Arbuckle gravelly loam, 15 to 25 percent slopes							
Arbuckle loam, 2 to 8 percent slopes	6	8					11
Arbuckle loam, 8 to 15 percent slopes	5	8					
Arbuckle gravelly loam, 2 to 25 percent slopes, severely eroded							
Arbuckle gravelly clay loam, 2 to 8 percent slopes							11
Arlington loam, 2 to 5 percent slopes	5	8					7
Arlington fine sandy loam, 2 to 8 percent slopes	6	8					6
Arlington fine sandy loam, 8 to 15 percent slopes	5	8					
Arlington fine sandy loam, deep, 0 to 2 percent slopes	6	8			3.0	5.0	7
Arlington fine sandy loam, deep, 2 to 8 percent slopes	6	8			3.0	5.0	7
Arlington fine sandy loam, deep, 8 to 15 percent slopes	5	8					
Arlington loam, deep, 0 to 5 percent slopes	6	8			3.0	5.0	7
Arlington loam, deep, 5 to 15 percent slopes	5	8			3.0	5.0	
Arlington and Greenfield fine sandy loams, 2 to 8 percent slopes, eroded	6	8					7
Arlington and Greenfield fine sandy loams, 8 to 15 percent slopes, eroded	5	8					
Arlington and Greenfield fine sandy loams, 15 to 35 percent slopes, severely eroded							
Auld clay, 2 to 8 percent slopes							
Auld clay, 8 to 15 percent slopes							
Bonsall fine sandy loam, 2 to 8 percent slopes	5	8					
Bonsall fine sandy loam, 8 to 15 percent slopes	5	8					
Bosanko clay, 2 to 8 percent slopes							
Bosanko clay, 8 to 15 percent slopes							
Buchenau loam, slightly saline-alkali, 0 to 2 percent slopes							6
Buchenau loam, slightly saline-alkali, 2 to 8 percent slopes							6
Buchenau silt loam, 2 to 8 percent slopes, eroded							6
Buren fine sandy loam, 2 to 8 percent slopes, eroded							8
Buren fine sandy loam, 8 to 15 percent slopes, eroded							7
Buren loam, 5 to 15 percent slopes, severely eroded							7
Buren loam, deep, 2 to 8 percent slopes, eroded	6	8			2.5	4.0	9
Cajalco fine sandy loam, 8 to 15 percent slopes, eroded							
Cajalco fine sandy loam, 2 to 8 percent slopes, eroded							
Cajalco fine sandy loam, 15 to 35 percent slopes, eroded							
Chino silt loam, drained							8
Chino silt loam, drained, saline-alkali							7
Chino silt loam, strongly saline-alkali							
Cieneba sandy loam, 5 to 8 percent slopes							
Cieneba sandy loam, 8 to 15 percent slopes, eroded							
Cortina gravelly coarse sandy loam, 2 to 8 percent slopes	6	8			2.5	4.0	5

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a crop is not commonly grown on the soil or is not economically suited to that soil]

Irrigated crops—Continued												Dryland crop	
Alfalfa	Barley		Oranges		Potatoes				Pasture		Barley	
					Spring		Fall					
B	A	B	A	B	A	B	A	B	A	B	A	B
Tons[3]	*Cwt.*	*Cwt.*	*Boxes*[4]	*Boxes*[4]	*Cwt.*	*Cwt.*	*Cwt.*	*Cwt.*	*A.U.M.*[5]	*A.U.M.*[5]	*Cwt.*	*Cwt.*
	18	25							6	11	7	11
									6	11	5	10
14	20	30	200	380					7	14	6	10
	15	25	200	380					7	14	5	10
	15	25	180	300					7	12	5	8
14	20	30	200	380					9	15	6	10
	15	25	200	380					7	14	5	10
									7	12		
14	20	30	180	300					9	15	6	10
9	15	25	310	410	300	350	275	300	8	15	8	10
8	15	25	310	410	300	350	275	300	8	15	8	11
			300	380	300	350	275	300	7	12	6	10
9	20	30	350	450	300	350	275	300	9	18	8	12
9	15	25	350	450	300	350	275	300	9	15	8	11
	15	20	350	450	300	350	275	300	8	13	6	10
9	20	30	350	450	300	350	275	300	9	18	8	12
	15	20	350	450					9	15	8	11
9	15	25	310	410					8	15	8	10
			300	380					7	12	6	10
			180	350					6	11		
	20	30							8	15	10	15
	15	25							8	12	8	14
	15	25	150	300					6	10	5	10
			150	300					6	10	4	8
	20	30	150	300					6	11	7	15
	15	25	150	300					6	11	5	15
8	15	30			275	300	225	250	6	12		
8	15	30							6	11	4	8
8	15	30							6	11	5	10
10	15	20	200	300	300	350	275	300	8	14	6	8
9	20	30	150	300					7	12	10	12
9	10	15	150	300							6	8
11	20	35	200	400	300	350	275	300	9	18	12	14
	15	25	300	400	300	350	275	300	6	11	5	8
	15	25	300	400					6	11	5	10
			150	300								
10	20	35			300	350	275	300	5	9	8	14
9	15	25			275	300	225	250	4	8	4	8
									4	8		
			100	280					6	10	4	8
			100	280					6	10	4	8
7			180	370					5	10	4	8

TABLE 2.—Estimated average acre yields of principal crops under two levels of

Soil	Irrigated crops						
	Apricots		Peaches		Wine grapes		Alfalfa
	A	B	A	B	A	B	A
	Tons[1]	*Tons*[1]	*Lugs*[2]	*Lugs*[2]	*Tons*	*Tons*	*Tons*[3]
Cortina sandy loam, 0 to 2 percent slopes							3
Cortina gravelly sandy loam, 0 to 2 percent slopes							
Cortina cobbly sandy loam, 2 to 12 percent slopes							
Delhi fine sand, 2 to 15 percent slopes, wind-eroded	4	7			2.5	4.5	6
Delhi loamy fine sand, 0 to 2 percent slopes	4	7			2.5	4.0	6
Dello loamy fine sand, 0 to 2 percent slopes					3.0	5.0	6
Dello loamy sand, 0 to 5 percent slopes					2.5	4.0	6
Dello loamy sand, gravelly substratum, 0 to 5 percent slopes							4
Dello loamy fine sand, saline-alkali, 0 to 5 percent slopes							4
Dello loamy fine sand, gravelly substratum, 0 to 2 percent slopes							4
Domino silt loam, saline-alkali							6
Domino fine sandy loam, eroded							6
Domino fine sandy loam, saline-alkali							4
Domino silt loam							6
Domino silt loam, strongly saline-alkali							
Escondido fine sandy loam, 8 to 15 percent slopes, eroded							
Escondido fine sandy loam, 2 to 8 percent slopes, eroded							4
Exeter sandy loam, 0 to 2 percent slopes							6
Exeter sandy loam, 2 to 8 percent slopes, eroded							6
Exeter sandy loam, slightly saline-alkali, 0 to 5 percent slopes							6
Exeter sandy loam, deep, 0 to 2 percent slopes							7
Exeter sandy loam, deep, 2 to 8 percent slopes, eroded					2.5	4.0	7
Exeter very fine sandy loam, 0 to 5 percent slopes							6
Exeter very fine sandy loam, deep, 0 to 5 percent slopes					3.0	5.0	7
Fallbrook sandy loam, 8 to 15 percent slopes, eroded					3.0	5.0	
Fallbrook sandy loam, 15 to 25 percent slopes, eroded							
Fallbrook sandy loam, shallow, 5 to 8 percent slopes, eroded							6
Fallbrook fine sandy loam, 2 to 8 percent slopes, eroded					3.0	5.0	6
Fallbrook fine sandy loam, shallow, 8 to 15 percent slopes, eroded							
Garretson gravelly very fine sandy loam, 2 to 8 percent slopes	6	8	800	1,000	6.0	8.0	8
Garretson very fine sandy loam, 0 to 2 percent slopes	6	8	800	1,000	8.0	10.0	9
Garretson very fine sandy loam, 2 to 8 percent slopes	6	8	800	1,000	8.0	10.0	9
Garretson very fine sandy loam, 8 to 15 percent slopes, eroded	6	8			8.0	10.0	
Garretson gravelly very fine sandy loam, 0 to 2 percent slopes	6	8	800	1,000	6.0	8.0	8
Garretson gravelly very fine sandy loam, 8 to 15 percent slopes, eroded	6	8	750	950	6.0	8.0	
Gorgonio gravelly loamy fine sand, 2 to 15 percent slopes	6	8	600	730	1.5	2.7	5
Gorgonio loamy sand, 0 to 8 percent slopes	5	7	550	700	2.5	3.5	6
Gorgonio loamy sand, 8 to 15 percent slopes	5	7	550	700	2.5	3.5	
Gorgonio loamy sand, deep, 2 to 8 percent slopes	6	8	600	730	1.5	5.0	6
Gorgonio cobbly loamy fine sand, 2 to 15 percent slopes	6	8	550	700			

management for the Southern California Coastal Plains, Land Resource Area 19—Continued

Irrigated crops—Continued											Dryland crop	
Alfalfa	Barley		Oranges		Potatoes				Pasture		Barley	
					Spring		Fall					
B	A	B	A	B	A	B	A	B	A	B	A	B
Tons[3]	Cwt.	Cwt.	Boxes[4]	Boxes[4]	Cwt.	Cwt.	Cwt.	Cwt.	A.U.M.[5]	A.U.M.[5]	Cwt.	Cwt.
5	4	10	150	250					5	10	4	6
									5	10	4	6
			250	370					4	8		
12	10	15	200	300					6	10	4	8
12									6	10	4	8
12	10	20			275	350	250	275	5	10	4	6
10	6	12							4	8	4	6
7	6	12							4	8	4	6
7	10	20							4	8	4	6
7	6	12							6	10	4	6
8	20	30							4	8	4	8
10	15	25							4	8	4	8
7	20	30							4	8	4	8
10	15	30							6	10	6	10
	15	25							4	8		
	10	15	150	300					6	10	7	14
7	10	15	150	300					6	12	8	16
8	20	30			300	350	275	300	6	12	6	11
8	15	25			300	350	275	300	6	12	6	10
8	15	25			275	300	225	275	5	10	6	10
10	20	30			300	350	275	300	6	14	7	12
10	20	30			300	350	275	300	6	14	7	12
8	15	25			300	350	275	300	6	12	6	10
10	20	30			300	350	275	300	6	14	7	12
	15	20	300	400					7	12	6	8
			150	300								
8	15	20	150	300					6	10	4	6
8	15	20	300	400	325	375	275	300	7	14	6	11
	10	15	150	300					7	12	6	8
12	12	20	300	450					8	15	9	17
13	20	30							10	18	9	17
13	20	30	300	450					9	16	9	17
	15	25	300	450					8	14	9	15
12	12	20	300	450					8	15	9	17
	12	20	300	450					8	14	9	15
8	6	12			300	350	275	300	4	8	8	10
8	4	10			300	350	275	300	4	8	8	12
					300	350	275	300	4	8	8	10
8	6	15			300	350	275	300	4	8	8	15

TABLE 2.—Estimated average acre yields of principal crops under two levels of

Soil	Irrigated crops						
	Apricots		Peaches		Wine grapes		Alfalfa
	A	B	A	B	A	B	A
	Tons[1]	*Tons*[1]	*Lugs*[2]	*Lugs*[2]	*Tons*	*Tons*	*Tons*[3]
Grangeville loamy fine sand, drained, 0 to 5 percent slopes					3.0	5.0	6
Grangeville sandy loam, drained, saline-alkali, 0 to 5 percent slopes							5
Grangeville sandy loam, sandy substratum, drained, 0 to 5 percent slopes							5
Grangeville sandy loam, sandy substratum, drained, saline-alkali, 0 to 5 percent slopes							4
Grangeville fine sandy loam, drained, 0 to 2 percent slopes					3.0	5.0	6
Grangeville fine sandy loam, drained, 5 to 15 percent slopes							
Grangeville fine sandy loam, poorly drained, saline-alkali, 0 to 5 percent slopes							
Grangeville fine sandy loam, saline-alkali, 0 to 5 percent slopes							
Grangeville fine sandy loam, loamy substratum, drained, 0 to 2 percent slopes					5.0	8.0	6
Grangeville fine sandy loam, loamy substratum, drained, saline-alkali, 0 to 2 percent slopes							4
Greenfield sandy loam, 2 to 8 percent slopes, eroded	6	8	750	1,000	4.0	7.0	7
Greenfield sandy loam, 0 to 2 percent slopes	6	8	750	1,000	5.0	8.0	7
Greenfield sandy loam, 8 to 15 percent slopes, eroded	6	8	750	950	4.0	7.0	
Greenfield sandy loam, 15 to 25 percent slopes. eroded	6	8	750	950			
Hanford coarse sandy loam, 2 to 8 percent slopes	6	8	750	1,000	3.0	5.0	7
Hanford loamy fine sand, 0 to 8 percent slopes	6	8	750	950	3.0	5.0	7
Hanford coarse sandy loam, 0 to 2 percent slopes	6	8	750	950	3.0	5.0	6
Hanford coarse sandy loam, 8 to 15 percent slopes, eroded	6	8	700	900	2.5	4.0	
Hanford coarse sandy loam, deep, 2 to 8 percent slopes, eroded							4
Hanford fine sandy loam, 0 to 2 percent slopes	6	8	900	1,000	5.0	8.0	8
Hilmar loamy sand, 0 to 2 percent slopes, eroded	5	7	450	600	4.0	8.0	6
Hilmar loamy very fine sand, 0 to 2 percent slopes					5.0	8.0	8
Hilmar loamy very fine sand, 2 to 8 percent slopes					5.0	8.0	6
Honcut sandy loam, 2 to 8 percent slopes	6	8	750	950	5.0	7.0	5
Honcut sandy loam, 8 to 15 percent slopes, eroded	6	8	750	950	5.0	7.0	
Honcut loam, 2 to 8 percent slopes, eroded	5	8	750	950	3.0	5.0	8
Las Posas loam, 8 to 15 percent slopes, eroded							
Las Posas loam, 2 to 8 percent slopes					5.0	7.0	
Las Posas loam, 5 to 8 percent slopes, eroded							
Las Posas loam, 8 to 25 percent slopes, severely eroded							
Madera fine sandy loam, 0 to 2 percent slopes							4
Madera fine sandy loam, 2 to 5 percent slopes, eroded							4
Madera fine sandy loam, 5 to 15 percent slopes, eroded							
Madera fine sandy loam, shallow, 2 to 8 percent slopes, eroded							
Metz loamy fine sand, 0 to 2 percent slopes	5	7			2.0	3.0	4
Metz loamy fine sand, gravelly sand substratum, 0 to 5 percent slopes	5	7					4
Metz loamy fine sand, sandy loam substratum, 0 to 5 percent slopes	6	8	450	600	3.0	5.0	6
Metz loamy sand, 2 to 8 percent slopes	5	7			2.0	3.0	4

management for the Southern California Coastal Plains, Land Resource Area 19—Continued

Irrigated crops—Continued											Dryland crop	
Alfalfa	Barley		Oranges		Potatoes				Pasture		Barley	
					Spring		Fall					
B	A	B	A	B	A	B	A	B	A	B	A	B
Tons[3]	*Cwt.*	*Cwt.*	*Boxes*[4]	*Boxes*[4]	*Cwt.*	*Cwt.*	*Cwt.*	*Cwt.*	*A.U.M.*[5]	*A.U.M.*[5]	*Cwt.*	*Cwt.*
8	20	30	...	...	175	200	...	...	5	9	8	12
8	15	30	...	...	...	...	...	...	6	12	6	12
8	15	30	...	...	...	...	...	...	4	8	6	12
6	15	25	...	...	...	...	...	...	4	8	6	10
10	20	30	...	...	...	...	...	...	9	13	12	18
...	15	30	...	...	...	...	...	...	6	12	8	15
...	15	25	...	...	...	...	...	...	4	8	4	8
...	15	25	...	...	...	...	...	...	4	12	6	12
8	20	30	...	...	175	250	...	...	9	18	8	12
6	15	25	...	...	...	...	...	...	4	8	6	10
10	20	30	350	450	450	500	375	425	9	15	10	17
10	20	30	350	450	450	500	375	425	9	18	10	17
...	15	25	350	450	450	500	375	425	8	12	10	15
...	...	...	300	400	300	500	300	425	5	12	8	12
10	15	30	350	460	450	500	375	425	7	13	9	17
9	10	20	300	400	400	500	375	425	5	10	9	17
9	15	25	...	...	450	500	375	405	5	9	9	17
...	15	25	300	400	450	500	375	425	7	12	8	15
6	10	20	150	300	400	450	325	375	5	9	6	10
10	20	30	...	...	400	500	375	425	10	18	9	17
9	6	15	...	...	175	300	150	250	6	10	9	16
10	10	20	...	...	...	...	...	...	7	15	9	17
9	10	20	...	...	...	...	...	...	6	12	9	15
7	15	25	250	350	400	500	375	425	6	12	8	12
...	15	25	200	350	400	500	375	425	6	16	6	12
10	15	25	250	350	...	...	...	...	9	16	8	12
...	6	12	150	350	...	...	...	...	6	12	6	16
...	10	20	150	300	...	...	...	...	7	12	12	16
...	6	12	100	250	...	...	...	...	7	12	10	14
...	...	...	100	250	...	...	...	...	...	...	...	...
7	10	20	...	...	175	250	150	175	7	12	8	12
7	10	20	...	...	175	250	150	175	7	12	8	12
...	6	15	...	...	...	...	...	...	6	11	6	10
...	6	12	...	...	...	...	...	...	5	10	4	8
7	15	25	250	350	400	450	350	375	5	9	4	8
7	6	20	200	300	400	450	350	375	5	9	4	8
9	15	25	300	400	400	450	350	375	6	12	4	8
7	10	20	200	300	400	450	350	375	4	8	1	8

TABLE 2.—Estimated average acre yields of principal crops under two levels of

Soil	Irrigated crops						
	Apricots		Peaches		Wine grape		Alfalfa
	A	B	A	B	A	B	A
	Tons[1]	*Tons*[1]	*Lugs*[2]	*Lugs*[2]	*Tons*	*Tons*	*Tons*[3]
Metz gravelly sandy loam, 2 to 15 percent slopes	6	8			2.5	4.0	4
Monserate sandy loam, 5 to 8 percent slopes, eroded							6
Monserate sandy loam, 0 to 5 percent slopes							6
Monserate sandy loam, 8 to 15 percent slopes, eroded							
Pachappa fine sandy loam, 2 to 8 percent slopes, eroded	6	8	800	1,000	6.0	10.0	7
Pachappa fine sandy loam, 0 to 2 percent slopes	6	8	800	1,000	6.0	10.0	8
Perkins gravelly loam, 5 to 8 percent slopes							4
Perkins gravelly loam, 2 to 5 percent slopes							4
Perkins loam, 2 to 8 percent slopes							
Perkins gravelly loam, 8 to 15 percent slopes, eroded							
Placentia fine sandy loam, 0 to 5 percent slopes							
Placentia fine sandy loam, 5 to 15 percent slopes							
Porterville cobbly clay, 2 to 15 percent slopes							
Porterville clay, 0 to 8 percent slopes							6
Porterville clay, moderately deep, 2 to 8 percent slopes							5
Porterville clay, moderately deep, slightly saline-alkali, 0 to 5 percent slopes							6
Porterville gravelly clay, moderately deep, 2 to 15 percent slopes, eroded							6
Ramona sandy loam, 2 to 5 percent slopes, eroded	5	8	750	950	8.0	10.0	6
Ramona sandy loam, 0 to 2 percent slopes	6	8	750	950	8.0	10.0	6
Ramona sandy loam, 0 to 5 percent slopes, severely eroded					7.0	9.0	6
Ramona sandy loam, 5 to 8 percent slopes, eroded	5	8	750	950	7.0	9.0	6
Ramona sandy loam, 5 to 8 percent slopes, severely eroded			700	900	5.0	8.0	6
Ramona sandy loam, 8 to 15 percent slopes, eroded	5	8	700	950	5.0	8.0	
Ramona sandy loam, 8 to 15 percent slopes, severely eroded			700	900			
Ramona sandy loam, 15 to 25 percent slopes, severely eroded			400	600			
Ramona sandy loam, moderately deep, 8 to 15 percent slopes, eroded							
Ramona sandy loam, moderately deep, 15 to 25 percent slopes, severely eroded							
Ramona very fine sandy loam, 0 to 8 percent slopes, eroded	5	8	750	950	7.0	9.0	7
Ramona very fine sandy loam, moderately deep, 0 to 8 percent slopes, eroded							6
San Emigdio fine sandy loam, 2 to 8 percent slopes, eroded	6	8			6.0	8.0	7
San Emigdio fine sandy loam, 0 to 2 percent slopes	6	8			8.0	10.0	7
San Emigdio fine sandy loam, 8 to 15 percent slopes, eroded	6	8					6
San Emigdio fine sandy loam, deep, 0 to 2 percent slopes	6	8			6.0	8.0	7
San Emigdio loam, 0 to 2 percent slopes	6	8	800	1,000	6.0	10.0	8
San Emigdio loam, 2 to 8 percent slopes	6	8	800	1,000	6.0	10.0	8
San Emigdio loam, 8 to 15 percent slopes, eroded	6	8	750	950	5.0	8.0	8
San Timoteo loam, 8 to 25 percent slopes, eroded							
Traver loamy fine sand, saline-alkali, eroded							5
Traver loamy fine sand, eroded					5.0	7.0	6
Traver fine sandy loam, saline-alkali							5

management for the Southern California Coastal Plains, Land Resource Area 19—Continued

Irrigated crops—Continued											Dryland crop	
Alfalfa	Barley		Oranges		Potatoes				Pasture		Barley	
					Spring		Fall					
B	A	B	A	B	A	B	A	B	A	B	A	B
Tons[3]	Cwt.	Cwt.	Boxes[4]	Boxes[4]	Cwt.	Cwt.	Cwt.	Cwt.	A.U.M.[5]	A.U.M.[5]	Cwt.	Cwt.
7	15	25	200	350	400	450	350	375	5	10	4	8
8	10	20	150	300	350	400	250	275	7	12	6	10
8	10	20	150	300	350	400	250	275	7	12	6	10
	6	12	100	200					6	12	4	8
12	20	30	300	400	400	500	350	375	9	18	9	17
13	20	30			400	500	350	375	10	18	9	17
6	15	25	250	350	350	400	300	325	6	12	8	12
6	15	25	250	350	350	400	300	325	7	12	8	12
	15	25	250	350	350	400	300	325	6	12	8	12
	6	12	250	350	350	400	300	325	5	11	6	10
	13	18							6	12	6	10
	6	12							6	12	4	8
			150	300					7	12	8	12
10	20	30	150	300					7	12	8	12
8	18	25	150	300					6	11	8	12
8	15	25							5	9	8	12
8	10	20							6	10	6	10
8	20	30	200	350	400	450	350	375	9	18	13	16
8	20	30	200	350	400	450	350	375	10	18	13	16
8	6	12	180	300					8	13	8	14
8	15	25	200	350	400	450	350	375	8	13	8	14
8	4	10	180	300					7	12	8	12
	15	25	180	300					7	12	8	12
			180	300					7	12	8	14
			150	250								
	6	12	150	300					7	12		
			150	300								
9	15	25	200	350	400	450	350	375	8	13	9	16
8			200	350					8	13	9	14
11	20	30	300	400	400	500	350	375	8	14	8	12
11	20	30	300	400	400	450	275	300	8	13	8	12
10	15	25	300	400	400	500	350	375	8	13	6	10
11	20	30	300	400	400	450	275	300			8	12
13	20	30			350	400	300	325	10	18	9	17
13	20	30	300	400	350	400	300	325	9	18	9	17
12	15	25	300	400	350	400	300	325	9	18	9	17
									7	14	8	18
10	20	35							5	9	4	8
10	20	35							5	10	4	8
10	20	35							5	9	5	10

TABLE 2.—Estimated average acre yields of principal crops under two levels of

Soil	Irrigated crops						
	Apricots		Peaches		Wine grapes		Alfalfa
	A	B	A	B	A	B	A
	Tons[1]	*Tons*[1]	*Lugs*[2]	*Lugs*[2]	*Tons*	*Tons*	*Tons*[3]
Traver fine sandy loam, strongly saline-alkali, eroded							
Tujunga loamy sand, 0 to 5 percent slopes							4
Tujunga gravelly loamy sand, 0 to 8 percent slopes	4	7	400	600	2.5	4.0	4
Vallecitos loam, thick solum variant, 2 to 8 percent slopes, eroded							4
Vallecitos loam, thick solum variant, 8 to 15 percent slopes, eroded							
Visalia sandy loam, 0 to 8 percent slopes, eroded	5	7	750	950	6.0	8.0	8
Visalia fine sandy loam, 0 to 2 percent slopes	5	7	750	950	6.0	8.0	8
Visalia fine sandy loam, 2 to 8 slopes	5	7	750	950	6.0	8.0	8
Vista coarse sandy loam, 8 to 15 percent slopes, eroded							
Vista coarse sandy loam, 2 to 8 percent slopes					3.0	5.0	7
Waukena fine sandy loam, saline-alkali							4
Waukena fine sandy loam, strongly saline-alkali							
Waukena loam, saline-alkali							4
Waukena loamy fine sand, saline-alkali							4
Willows silty clay, saline-alkali							5
Willows silty clay							4
Willows silty clay, strongly saline-alkali							
Willows silty clay, deep, saline-alkali							4
Willows silty clay, deep, strongly saline-alkali							
Wyman loam, 2 to 8 percent slopes, eroded	6	8	800	1,000	8.0	10.0	7
Wyman fine sandy loam, 8 to 15 percent slopes, eroded	6	8	750	950	8.0	10.0	
Yokohl loam, 2 to 8 percent slopes							4
Yokohl loam, 8 to 15 percent slopes, eroded							
Yokohl cobbly loam, 2 to 25 percent slopes, eroded							
Ysidora gravelly very fine sandy loam, 2 to 8 percent slopes, eroded							4
Ysidora gravelly very fine sandy loam, 8 to 25 percent slopes, eroded							
Ysidora very fine sandy loam, 2 to 15 percent slopes, eroded							6

[1] Picked or fresh weight.
[2] 22-pound lug or field box.
[3] Yield expressed as hay or air-dry.

management for the Southern California Coastal Plains, Land Resource Area 19—Continued

Irrigated crops—Continued											Dryland crop	
Alfalfa	Barley		Oranges		Potatoes: Spring		Potatoes: Fall		Pasture		Barley	
B	A	B	A	B	A	B	A	B	A	B	A	B
Tons[3]	*Cwt*	*Cwt.*	*Boxes*[4]	*Boxes*[4]	*Cwt.*	*Cwt.*	*Cwt.*	*Cwt.*	*A.U.M.*[5]	*A.U.M.*[5]	*Cwt.*	*Cwt.*
									4	8	4	8
6	6	12							5	9	4	7
6	6	12	200	300								
7	10	15	300	400					6	10	8	12
	10	15	300	400					5	9	6	10
10	20	30			400	450	375	425	9	15	8	14
12	20	30							10	18	8	14
10	20	30							9	15	8	14
	6	12	200	300					7	12	8	12
9	15	25	200	300					7	14	8	12
6	15	25							5	9	6	8
									5	9		
6	15	25							5	10	4	6
6	15	25							4	8	4	6
7	15	30							5	14	8	12
6	15	30							5	11	9	14
									4	8	6	10
6	15	30							5	9	8	12
									4	8	6	10
9	20	30	350	450	300	350	250	275	9	18	8	12
	15	25	350	450	300	350	250	275	9	15	6	10
7	10	20	150	300					8	15	6	11
	6	12	150	300					7	13	6	8
			150	300					6	12	5	8
7	10	20	180	300					8	15	8	12
			150	300					8	15	6	10
8	10	20	180	300					7	12	6	10

[4] 50-pound field boxes.

[5] Animal-unit-months per acre. The number of months one animal unit (1 cow, 1 horse, 5 sheep, or 5 goats) can be grazed per acre during the grazing season without damage to the pasture.

TABLE 3.—*Estimated average acre yields of principal crops under two levels of management for the Southern California Mountains, Land Resource Area 20*

[Yields are shown for crops actually grown or suited to the soil. Absence of a figure indicates crop is not commonly grown on the soil or is not economically suited to that soil]

Soil	Irrigated crops								Dryland crop	
	Peaches		Alfalfa		Potatoes		Pasture		Barley	
	A	B	A	B	A	B	A	B	A	B
	Lugs[1]	*Lugs*[1]	*Tons*[2]	*Tons*[2]	*Acres*	*Acres*	*A.U.M.*[3]	*A.U.M.*[3]	*Cwt.*	*Cwt.*
Anza fine sandy loam, 2 to 8 percent slopes			4	6	250	350	9	18	4	8
Anza loam, 0 to 2 percent slopes			4	6	300	400	10	18	4	8
Anza loam, 2 to 8 percent slopes			4	6	300	400	10	18	4	8
Bishop silt loam							10	18	4	8
Bull Trail sandy loam, 8 to 15 percent slopes, eroded							6	11	4	8
Bull Trail sandy loam, 5 to 8 percent slopes, eroded							7	12	4	8
Calpine sandy loam, 2 to 8 percent slopes, eroded	750	950	4	6	300	400	7	14	8	12
Calpine sandy loam, 8 to 15 percent slopes, eroded	750	950			300	400	7	12	8	12
Calpine loam, 2 to 8 percent slopes, eroded	750	950	4	6	300	400	9	18	8	12
Crouch loamy sand, 8 to 15 percent slopes, eroded	400	600					6	11	4	8
Crouch sandy loam, 8 to 15 percent slopes, eroded	600	800					6	11	4	8
Mottsville loamy sand, 2 to 8 percent slopes	400	600	4	6	250	350	7	12	6	10
Mottsville loamy sand, 8 to 15 percent slopes	400	600					6	10	5	9
Mottsville sandy loam, 2 to 8 percent slopes	750	950	4	6	300	400	7	13	8	12
Mottsville sandy loam, 8 to 15 percent slopes	750	950			300	400	7	12	8	12
Mottsville cobbly sandy loam, 8 to 25 percent slopes, eroded	400	600								
Oak Glen fine sandy loam, 5 to 15 percent slopes	750	950	3	5	250	350	7	12	8	12
Oak Glen gravelly sandy loam, 8 to 15 percent slopes	600	950					7	12	8	12
Oak Glen gravelly sandy loam, 15 to 25 percent slopes	600	750					7	12	8	12

[1] 22-pound lug or field box.
[2] Yield expressed as hay or air-dry.
[3] Animal-unit-months per acre. The number of months one animal unit (1 cow, 1 horse, 5 sheep, or 5 goats) can be grazed per acre during the grazing season without damage to the pasture.

based on the needs of the crop. Apricot trees require 60 cubic feet of barnyard manure per acre per year.

Under the B level of management, apricots grown on soils in all suitable vegetative soil groups, require a volunteer cover crop or a cover crop of 10 pounds of oats and 25 pounds of purple vetch per acre. Irrigation requirements are the same as for the A level of management. Apricot trees require 50 pounds of nitrogen and 160 cubic feet of barnyard manure applied between January 15 and February 15. They also require 50 pounds of nitrogen and 50 pounds of phosphorus per acre after harvest.

Peaches. Under the A level of management, peach trees grown on soils in all suitable vegetative groups require 100 pounds of nitrogen per acre per year. Shredded prunings and cover crops are disked into the soil as a mulch. Peach trees require 3.0 to 10.0 inches of irrigation water per acre per month. The furrow method of irrigation is used.

Under the B level of management, peach trees on all of the soils require 200 pounds of nitrogen per acre per year. The nitrogen is applied along with chicken manure. Peach trees require about 7.0 to 8.0 acre-inches of water per month during the peak growing season. Irrigation water is applied after 50 to 60 percent of the available moisture has been used. Varieties that yield well and have good storage and shipping qualities, such as Elberta, Rio Osa Gem, and Babcock, are grown.

Soils in vegetative soil group B require 3.0 to 4.0 inches of irrigation water per acre about every 14 days. If the soils in vegetative soil groups D and G are overirrigated, however, a perched water table is likely to occur.

Wine Grapes. Adapted varieties of black and white wine grapes are grown. On all of the soils, volunteer cover crops and shredded prunings help to reduce soil blowing.

Under the A level of management, the soils in vegetative soil group A require 50 pounds of nitrogen per acre per year drilled in January and February. Wine grapes require one irrigation of 12 to 15 inches of water applied late in spring. The soils in vegetative soil group B require 15 to 18 inches of water, applied late in summer to early in spring.

Under the B level of management, the soils in vegetative soil group A require 100 pounds of nitrogen per acre per year. The nitrogen is applied in January and February. Wine grapes require 12 to 15 inches of water per acre late in spring and the middle of summer. Soils in vegetative soil group B require 12 to 15 inches of water per acre early in spring and early in summer, and they also require 6 to 8 inches of water per acre late in summer. All other practices are the same as for soils in vegetative soil group A.

Alfalfa. Under the A level of management for the soils in vegetative soil groups A, D, and G, a suitable cropping sequence consists of 3 to 5 years of alfalfa, 1 year of a small grain, and 1 year of truck crops. The alfalfa seed is inoculated prior to seeding and is broadcast or drilled at the rate of 25 to 30 pounds per acre. Alfalfa requires about 6.0 to 10.0 inches of irrigation water every 30 days, or a total of 4.0 to 7.0 acre-feet per year. Borders or sprinklers are used to apply the irrigation water.

Under the B level of management in vegetative soil groups A, D, and G, a suitable cropping sequence is 5 to 7 years of alfalfa, 1 year of a small grain or sudangrass, and 1 year of truck crops, or 5 to 7 years of alfalfa and 2 years of grain or sudangrass. Adapted, certified alfalfa seed is used. It is inoculated prior to seeding and is drilled at the rate of 25 to 30 pounds per acre. Alfalfa requires about 8.5 inches of irrigation water every 28 days, or a total of 5.0 to 6.0 acre-feet per year. Borders or sprinklers are used to apply the irrigation water.

Under both the A and B levels of management, alfalfa on the soils in vegetative soil group B generally requires 4.0 inches of irrigation water every 15 days, or a total of 4.0 to 7.0 acre-feet per year under the A level of management, and 5.0 to 6.0 acre-feet per year under the B level of management.

Irrigated Barley. Under the A level of management for the soils in vegetative soil groups A and F, a suitable cropping sequence is 1 year of a small grain, such as barley, and 1 year of truck crops. The seed is treated and drilled. Small grains require 4.0 inches of irrigation water about 1 to 3 times during the growing season. The number of irrigations depends on rainfall.

Under the B level of management for the soils in vegetative soil groups A and F, a suitable cropping sequence is 3 years of small grains and 1 year of truck crops. The seed is treated and drilled. Small grains require about 9 inches of irrigation water per acre during the growing season. About 40 to 60 pounds of nitrogen and 20 pounds of phosphorus per acre per year are required by grain during the second and third years of the cropping sequence.

Oranges. Under the A level of management, orange trees on all of the suitable soils require from 0 to 5 pounds of nitrogen per tree per year. Orange trees also require about 4 to 6 acre-inches of irrigation water per month. The water is applied throughout the growing season by sprinklers or furrows.

Under the B level of management, orange trees on all of the soils require 0 to 3 pounds of nitrogen per tree per year, or nitrogen, phosphorus, and microelements are applied according to the results indicated by leaf analysis. These trees also require 5.0 to 6.0 acre-inches of irrigation water per month during the peak growing season. The water is applied after 50 to 60 percent of the available water has been used. Care is needed to keep a perched water table from forming because of overirrigation on soils in vegetative soil groups D and G.

Potatoes. Both spring and fall potatoes are grown in the survey area. For spring potatoes grown under the A level of management on soils in all suitable vegetative soil groups, a typical cropping sequence is 1 year of potatoes and 1 year of small grain. White Rose seed potatoes that have been treated with mercuric chloride are planted between March 15 and April 15. About 80 pounds of nitrogen, 45 pounds of phosphorus, and 165 pounds of potassium per acre per year are applied as a sidedressing about 4 weeks after emergence. After the last irrigation, 80 pounds of nitrogen is required. Spring potatoes also require about 3 acre-feet of water per acre each year in 20 to 25 applications. The irrigation water is applied every 1 or 2 days in alternate furrows, or every 3 or 4 days in every furrow.

Under the B level of management for the soils in all suitable vegetative soil groups, a typical cropping sequence is 1 year of potatoes, beans, and a cover crop; 3

years of alfalfa; and one summer row crop. Apply fertilizer according to the results indicated by soil tests, or apply 100 pounds of nitrogen, 58 pounds of phosphorus, and if needed, 165 pounds of potassium as sidedressing about 4 weeks after emergence. After the last irrigation, 80 pounds of nitrogen is required. About 1.0 inch of irrigation water, applied by sprinkler, is required every fourth day or as needed. About 20 to 24 irrigations are needed during the growing season.

For fall potatoes grown under the A level of management on soils in all suitable vegetative soil groups, a typical cropping sequence is 1 year each of potatoes and silage corn or sudan sorghum, or 1 year each of potatoes and small grain. White Rose seed potatoes that have been treated with mercuric chloride are planted between July 5 and August 10. Fall potatoes require about 80 pounds of nitrogen, 45 pounds of phosphorus, and 165 pounds of potassium per acre per year. A sidedressing of 80 pounds of nitrogen per acre per hill is applied when 60 to 75 percent of the soil is shaded by the potato vines. These potatoes need about 2 acre-feet of irrigation water per acre per growing season. The water is applied by sprinkler at the rate of 1.0 to 1.5 acre-inches every 4 days.

Under the B level of management for the soils in all suitable vegetative soil groups, a typical cropping sequence is 1 year of potatoes and 4 to 6 years of alfalfa. White Rose seed potatoes that have been treated with mercuric chloride are planted between July 5 and August 10. Apply fertilizer according to the results indicated by soil tests, or apply 105 pounds of nitrogen, 55 pounds of phosphorus, and if needed, 165 pounds of potassium. Irrigation requirements are the same as for the A level of management.

Irrigated pasture. Under the A level of management, seeding generally is done at the rate of 2 pounds of alfalfa, 2 pounds of ladino clover, 1 pound of narrowleaf trefoil, 4 pounds of orchardgrass, 4 pounds of tall fescue, 2 pounds of common ryegrass, and 2 pounds of perennial rye grass per acre. Irrigation water is applied by borders or sprinklers. On soils in vegetative soil group A, 4.0 to 6.0 inches of irrigation water per acre is required every 15 to 30 days during the period of May to October. On the soils in vegetative soil group B, 4.0 to 6.0 inches of irrigation water per acre are required every 12 to 20 days. On the soils in vegetative soil groups D and G, 2.0 to 4.0 inches of irrigation water are applied every 15 days. Pasture on soils in all vegetative soil groups requires 60 pounds of nitrogen per acre following establishment, and 42 pounds per acre in April and in October. The fertilizer is applied annually. Soils in vegetative soil group F also require 3 to 5 tons of gypsum per acre.

Under the B level of management, a mixture of locally suited varieties of grasses and legumes are seeded. On soils in all vegetative soil groups, 50 pounds of nitrogen and 25 pounds of phosphorus per acre are applied in March and April. About 40 pounds of nitrogen is applied just before irrigation in the period of May to October. About 32 pounds of nitrogen and 18 pounds of phosphorus per acre are applied in November. Irrigation is by borders or sprinklers in most places. On soils in vegetative soil group A, pasture requires 4.0 to 6.0 inches of irrigation water per acre every 15 to 30 days. Pasture requires from 4.0 to 6.0 inches of irrigation water per acre every 10 to 20 days on soils in group B, and from 3.0 to 6.0 inches of irrigation water every 10 days on soils in groups D and G. A perched water table is likely to develop if the pasture is overirrigated. Except that only the border method of irrigation is used, the soils in vegetative soil groups E and F have the same requirements as those in group A. The soils in groups E and F also require gypsum. The gypsum should be applied according to the results indicated by soil tests. Tile drains or open ditch drains also may be needed.

Dryland barley. Under the A level of management, a suitable cropping sequence on all of the soils is 1 year of barley and 1 year of fallow. After treatment with a fungicide, the barley seed is drilled but not fertilized.

Under the B level of management, a typical cropping sequence on all of the soils is 1 year each of barley, volunteer pasture, and fallow. About 20 to 30 pounds of nitrogen is required and is applied in the mulch. After treatment with a fungicide, the barley seed is drilled.

Storie Index Rating

The soils of the Area are rated according to the Storie index (*9*). This index expresses numerically the relative degree of suitability, or value of a soil for general intensive farming. The rating is based on soil characteristics only and is obtained by evaluating such factors as depth, texture of the surface soil, density of subsoil, drainage, salts and alkali, and relief. Other factors, such as availability of water for irrigation, climate, and distance from markets, that might determine the desirability of growing certain plants in a given locality, are not considered. Therefore, in itself the index cannot be considered as an index of land value. The index rating is given in the "Guide to mapping units".

Four general factors are considered in the index rating. These factors are (A) the characteristics of the soil profile and soil depth; (B) the texture of the surface soil; (C) slope; and (X) other factors, such as drainage, salts and alkali, and erosion. Each of these four general factors is evaluated on the basis of 100 percent. A rating of 100 percent expresses the most favorable, or ideal, condition, and lower percentage ratings are given for conditions that are less favorable for crop production.

The index rating for a soil is obtained by multiplying the four factors, A, B, C, and X; thus, any factor may dominate or control the final rating. For example, a soil may have an excellent profile justifying a rating of 100 percent for factor A, excellent texture of the surface soil justifying 100 percent for factor B, a smooth, nearly level surface justifying 100 percent for factor C, but a high accumulation of salts or alkali that would give a rating of 10 percent for factor X. Multiplying these four ratings gives an index rating of 10 for this soil. The high accumulation of salts or alkali would dominate the quality of the soil, render it unproductive for crops, and justify the low index rating of 10.

Soils are placed in grades according to their suitability for farming as shown by their Storie index ratings. The six grades and their range in index ratings are:

[3] Prepared by Eugene L. Begg, soils specialist, University of California, Davis.

	Index rating
Grade 1	80 to 100
Grade 2	60 to 79
Grade 3	40 to 59
Grade 4	20 to 39
Grade 5	10 to 19
Grade 6	Less than 10

Soils of grade 1 have few or no limitations that restrict their use for crops. Soils of grade 2 are suitable for most crops, but they have minor limitations that narrow the choice of crops and have few special management needs. Grade 3 soils are suited to a few crops or to special crops and require special management. Grade 4 soils are severely limited for crops. If used for crops, they require careful management. Grade 5 soils generally are not suited to cultivated crops but can be used for pasture and range. Grade 6 consists of soils and land types that generally are not suited to farming.

Use of the Soils for Range[3]

About 450,000 acres in Western Riverside Area is now used for grazing livestock. The acreage in range is decreasing, and about 50,000 acres that formerly was in range is now being farmed intensively, is in orchards and in homesites, or is used for recreation. Cattle is the main livestock, though sheep and goats also graze the range. The cattle enterprise consists of cow-calf and stocker operations. The cow-calf operator maintains a breeding herd continuously at weaning age. The stocker operator buys stock in the fall and grazes the stock during the green feed period, and then sells the stock or moves it to available feed after the green feed dries up. Sheep are wintered on some grassland as well as on alfalfa and grain stubble. This practice, however, is decreasing as sheep range is being diverted to other land use. Goats are raised for both milk and mohair.

Range in the Western Riverside Area is made up mostly of annual grass on open and oak grassland, and on pine grassland in the higher elevations. Brushy chaparral or sagebrush also occur.

The original plant communities in the survey area consisted of open grassland dominated by perennial grass; of woodland and grass areas made up of perennial grasses and oaks in scattered to slightly dense stands; of Coastal sagebrush dominated by such shrubs as flattop buckwheat and California sagebrush; and of chaparral dominated by such shrubs as ceanothus, scrub oak, chamise, and manzanita. Jeffrey pine and other pines grew at the higher elevations in areas of open grassland and of woodland and grass. Perennial grasses and forbs, similar to those growing in areas of open grassland, occurred in the understory of both the Coastal sagebrush and chaparral plant communities.

Many changes have occurred in the original plant cover. Intensive cultivation has replaced much of the grazing. Brush has invaded the grassland and has increased in the brushland as a result of fire and heavy grazing. The native perennial bunchgrasses have decreased and introduced annuals have increased. As a result, the grasses and shrubs most desirable as forage for livestock have decreased and the less desirable or undesirable plants for grazing have increased.

Desirable forage plants include soft chess, ryegrass, wild oats, redstem and whitestem filaree, burclover, other annual clovers, and such remnant perennial grasses as needlegrass, creeping wildrye, and junegrass. Some of the less desirable plants are ripgut brome, wild barley, annual fescues, red brome, and broadleaf filaree. Such undesirable plants as nitgrass, tarweed, fiddleneck, popcornflower, turkeymullein, thistle, and mustard occur throughout the western part of the survey area. Mustard and tarweed infestations are common on open grassland. In some areas brushy species have increased, particularly in areas where grazing has been heavy or the soils are eroded.

Range sites

The soils used for grazing in the Western Riverside Area have been grouped into range sites. Each site differs from other sites in its ability to produce significantly different kinds and amounts of range plants and in the management needed to keep the site in good condition. The grouping is based partly on the soils and partly on the climate.

Range sites differ from each other in potential annual forage production; in their capability to maintain a dynamic equilibrium with their environment if not seriously disturbed by overgrazing, fire, or insect infestation; and in response to management. The potential productivity of a site is achieved when the plant composition has the highest amount of desirable forage plants that the site can support, and the soil is well protected by plant litter and mulch. Improvement of the native vegetation will assure the production of range forage and the conservation of soil, water, and plants. This can be done by managing the grazing to increase or maintain the best forage plants.

Successive, though overlapping, stages in growth of grass are the growth of leaves, growth of roots, formation of flower stalks, production of seed, regrowth of forage, and storage of food in the roots. Grazing must allow for these natural processes of growth if optimum growth of forage plants and gains in weight or numbers of animals are to be obtained.

Livestock graze selectively, and they seek out the palatable and nutritious plants. If grazing is not carefully regulated the more desirable plants are weakened or eliminated. Less desirable plants then increase. If grazing pressure continues, the less desirable plants are thinned out or eliminated and undesirable, unpalatable plants take their place or the soil is left bare. Production on potentially high producing range can be reduced to almost nothing by continuous use. Conversely, if an area is lightly used or is not grazed for years, ripgut brome and other rank, less desirable plants increase.

Adequate residues of the current year's growth left on the surface result in higher production and a more desirable plant composition. The forage left on the surface—

1. Serves as a mulch that encourages rapid intake and storage of water from rainfall. The more water stored in the soil, the greater the plant growth.
2. Protects the soil from washing and blowing.
3. Reduces year to year fluctuation in forage produc-

[3] By Irving L. Sealander, range conservationist, Soil Conservation Service.

tion because, if vigorous, plants make more efficient use of the precipitation received.

4. Holds moisture near the surface after the first rains in fall so that seeds can germinate and get off to an early start.
5. Provides a reserve of feed for years when growing conditions are unfavorable.
6. Provides dry roughage to supplement succulent green feed. This reduces the hazard of bloat and of grass tetany and balances the feed for better grain.

Variations in weather in the survey area are marked and greatly affect the production of forage. Consequently, even though a range site in the Southern California Coastal Plains, Land Resource Area 19, has soils similar to those in a range site in the Southern California Mountains, Land Resource Area 20, the two sites differ in kind of plants and in management needed. Annual precipitation ranges from 9 to 18 inches in Land Resource Area 19, and from 10 to 30 inches in Land Resource Area 20. In the areas that have less precipitation, productivity is lower and the plant composition is likely to differ from that on similar soils where precipitation is greater. The land resource areas are discussed under the section, "Use and Management of the Soils" and are outlined on the General Soil Map at the back of this survey.

Following is a discussion of the 13 range sites in the Western Riverside Area.

CLAYEY SITE

Soils of this site are in the western and central parts of the survey area in Land Resource Area 19. They are in the Altamont, Auld, Bosanko, and Porterville series. These soils are moderately deep to very deep, nearly level to steep clays that are rocky or cobbly in places. Some of the soils are eroded, and some are slightly affected by salts and alkali.

Permeability of these soils is moderately slow to slow. The available water capacity is over 5.0 inches and fertility is moderate to high.

The plant cover on this site is grass or grasses and forbs. These soils produce large amounts of wild oats and burclover and smaller amounts of soft chess, ryegrass, and cutleaf filaree. In places needlegrass and other perennial grasses are predominant. Under heavy grazing all of these desirable grasses are replaced by less desirable grasses, such as ripgut brome, red brome, poverty fescue, and weedy annuals. In some years tarweed is a problem on a depleted range, but wild mustard is likely to infest even well-managed range.

The soils of this site are well suited to annual grasses and legumes. The response to fertilizer is good.

In areas not fertilized and where management is otherwise not improved, estimated annual production of air-dry forage for livestock is 2,400 pounds per acre in years of favorable moisture and 1,000 pounds in years of unfavorable moisture. Total annual yields can be increased two to four times by adding fertilizer and improving management.

SHALLOW CLAYEY SITE

Murrieta stony clay loam, 2 to 25 percent slopes, is the only soil in this site. It is shallow and stony and is in the west and central parts of the survey area in Land Resource Area 19.

Permeability of this soil is slow. Available water capacity is 2.0 to 3.0 inches and fertility is moderate.

The plant cover on this site is open brush that has an understory or a few open grassy areas of soft chess, wild oats, red brome, nitgrass, wild barley, cutleaf filaree, and other grasses and forbs. In places needlegrasses and other perennial grasses also are present. Flattop buckwheat, white and black sage, and ceanothus are the predominant shrubs.

When the range has been depleted through heavy grazing or fire, the desirable plants, such as soft chess and wild oats, decrease and are replaced by less desirable and undesirable plants, such as red brome and brush. Because this soil is shallow, its potential productivity is low. Only limited results are gained through range seeding and brush control.

In areas not fertilized and where management otherwise is not improved, estimated annual production of air-dry forage for livestock on this site is 600 pounds per acre in years of favorable moisture and 100 pounds in years of unfavorable moisture. Total annual yields can be increased 1½ to 2 times by adding fertilizer and improving management.

CLAYPAN SITE

In this range site are nearly level to moderately steep soils. These soils are in the central and western parts of the survey area in Land Resource Area 19. They are in the Bonsall, Madera, Perkins, Placentia, and Yokohl series. They have a surface layer of loam or fine sandy loam that is gravelly or cobbly in places. These shallow to very deep soils are on a claypan or a hardpan, or have a fine-textured subsoil. Some of the soils are eroded or severely eroded.

Permeability of these soils is slow to very slow. Available water capacity is 2.0 to 10.5 inches, and fertility is moderate to low.

The plant cover on this site consists predominantly of such desirable and less desirable annuals as soft chess, wild oats, and ripgut brome. In a few places needlegrasses, creeping wildrye, and other perennial grasses are present, and in many places cutleaf filaree is abundant. Burclover grows on this site, but it is not so common as it is on the Clayey site. Plant composition is similar to that of the Loamy site, but productivity is lower.

When the range has been depleted through heavy grazing, the desirable grasses decrease and are replaced by such less desirable grasses as ripgut brome, poverty fescue, and weedy annuals. In some years tarweed is common on well-managed range and pasture, though it generally is more abundant on heavily grazed and depleted areas. Wild mustard also is likely to infest well-managed range and pasture in some years.

Most soils of this site are suitable for seeding and brush control. The response is not so good, however, as on the soils of the Clayey and Loamy sites.

In areas not fertilized and where management otherwise is not improved, estimated annual production of air-dry forage on this site is 1,300 pounds per acre in years of favorable moisture and 800 pounds in years of unfavorable moisture. Total annual yields can be increased two to

three times by adding fertilizer and improving management.

LOAMY SITE

Soils of this range site are at elevations below 3,500 feet in Land Resource Area 19. They are in the Arbuckle, Arlington, Buchenau, Buren, Cajalco, Escondido, Exeter, Fallbrook, Garretson, Greenfield, Hanford, Honcut, Las Posas, Monserate, Pachappa, Ramona, San Emigdio, San Timoteo, Soper, Visalia, Vista, Wyman, and Ysidora series. The variants from the Vallecitos series are also in this site. The soils in this site are moderately deep to very deep and are nearly level to steep. The surface layer ranges from sandy loam to clay loam. Many of the soils are eroded or severely eroded, and some of the soils are slightly affected by salts and alkali.

Permeability is moderately rapid to moderately slow in these soils. Available water capacity is over 3.75 inches and fertility is moderate to high.

The potential plant cover on this site is grass and brush or grass. The predominant desirable annuals are soft chess, wild oats, and cutleaf filaree. In places needlegrasses and other perennial grasses grow and are abundant. The overstory consists of such shrubs as ceanothus, scrub oak, California sagebrush, white and black sage, sugar bush, and other sumacs.

Where the range has been depleted through heavy grazing, fire or any other reason, desirable grasses decrease and are replaced by less desirable plants, such as ripgut brome, and undesirable plants, such as red brome, nitgrass, lupine, and other annual weeds. Flattop buckwheat, California sagebrush, and chamise also increase.

Except for the cobbly Soper soil, the soils in this site respond to seeding and brush control. Regrowth of brush occurs unless it is controlled by chemical or other means.

In areas not fertilized and where management is otherwise not improved, estimated annual production of air-dry forage for livestock is 1,800 pounds per acre in years of favorable moisture and 600 pounds in years of unfavorable moisture. Total annual yields can be increased three or four times by adding fertilizer and improving management.

SHALLOW LOAMY SITE

The soils of this range site are shallow and loamy and are gently sloping to steep. They occur at elevations below 3,500 feet in Land Resource Area 19. These soils are in the Arbuckle, Buren, Cajalco, Cieneba, Fallbrook, Friant, Gaviota, Las Posas, Lodo, Monserate, Temescal, Vallecitos, and Ysidora series. The land type Terrace escarpments also is in this site. The soils in this site are moderately coarse textured and medium textured. Some of them are gravelly or rocky or cobbly, and many of them are eroded or severely eroded.

Permeability of these soils is moderately rapid to moderately slow. Available water capacity is mostly 1.0 to 7.5 inches and fertility is moderate to low.

The plant cover on this site is open to dense stands of brush. California sagebrush, flattop buckwheat, and white and black sage are predominant at lower elevations. As elevations increase, and on some northern exposures at lower elevations, these shrubs intermingle with and are replaced by ceanothus, scrub oak, manzanita, and other kinds of chaparral. The understory is made up of soft chess, wild oats, ryegrass, cutleaf filaree, and other annuals and of needlegrasses and other perennial grasses. The herbaceous understory is sparse.

When the range has been depleted through heavy grazing and fire, the desirable plants in the understory decrease and are replaced by such less desirable and undesirable plants as red brome, nitgrass, poverty fescue, popcornflower, and annual lupine. In places on severely eroded areas that have been depleted by fire, the plant cover consists of almost pure stands of chamise that have no herbaceous understory. Brush control and seeding are useful only for control of erosion and to provide protection from fire.

In areas not fertilized and where management otherwise is not improved, estimated annual production of air-dry forage on this site is 400 pounds per acre in years of favorable moisture and 100 pounds in years of unfavorable moisture. Total annual yields can be increased two to three times on soils in units AlE3, CaF2, CbD2, CbF2, ChC, ChD2, FbC2, FcD2, FkD2, FwE2, LaE3, MnD2, and MnE3 and on the Buren part of units RmE3 and RnE3 by adding fertilizer and improving management.

SANDY SITE

Soils of this range site are at elevations of less than 2,500 feet in Land Resource Area 19. Some of the soils are nearly level to strongly sloping or rolling and others are moderately steep. These soils are in the Cortina, Delhi, Dello, Gorgonio, Hanford, Hilmar, Metz, and Tujunga series. They consist mainly of very deep, coarse-textured soils that in places are stony or gravelly. Also in this site, however, are some coarse-textured and medium-textured soils that have a sandy or gravelly substratum.

Permeability is moderately rapid to very rapid. Available water capacity is 2.0 to 5.5 inches. Fertility is low to very low.

The plant cover on this site consists of such desirable annuals as soft chess, wild oats, and cutleaf filaree and of shrubs in scattered to moderately dense stands that have an overstory of goldenbush, California sagebrush, flattop buckwheat, and other shrubs. A few cottonwoods and other trees are also in the overstory. In places needlegrasses, junegrass, and other perennial grasses grow.

When the range has been depleted through heavy grazing or any other disturbance, desirable grasses decrease and are replaced by such less desirable and undesirable plants as red brome, nitgrass, and annual weeds. The brushy plants, particularly goldenbush and flattop buckwheat, also increase.

The soils of this site are suitable for brush control and for seeding adapted annual grasses and legumes. The response is not so good, however, as on soils of the Clayey and Loamy sites.

In areas not fertilized, and where management is not otherwise improved, estimated annual production of air-dry forage is 1,000 pounds per acre in years of favorable moisture and 200 pounds in years of unfavorable moisture. Total annual yields can be increased two to three times by adding fertilizer and improving management.

SANDY ALLUVIAL SITE

Soils of this range site are on river bottoms and along stream channels in Land Resource Area 19. They are

subject to frequent overflow. These soils are in the Cortina, Dello, Gorgonio, Hanford, Honcut, Metz, San Emigdio, Soboba, and Tujunga series. Most of these soils are coarse textured, but small areas are made up of finer textured alluvial or channeled soils. Some of the soils are gravelly, cobbly, or stony.

These soils have a rapidly permeable substratum. The available water capacity is 2.0 to 5.5 inches and fertility is low to very low.

The plant cover on this site is mostly scattered to dense stands of such shrubs and trees as baccharis, goldenbush, sagebrush, yerba santa, cottonwood, willows, and sycamore. The herbaceous understory is sparse. Less desirable annuals, such as red brome, nitgrass, and annual weeds predominate. Cutleaf filaree grows on soils of this site and is abundant in some years. Bermudagrass grows in small areas that have a high water table. Brush control is useful only for protection from fire and for control of phreatophyte.

Total annual production of air-dry forage on this site is 700 pounds per acre in years of favorable moisture and 150 pounds in years of unfavorable moisture.

SANDY BASIN SITE

Soils of this range site are in the northwestern, western, and central parts of the survey area in Land Resource Area 19. They are in the Domino, Grangeville, Traver, and Waukena series. Some of these soils are nearly level and are in basins, and others are nearly level to sloping and are on flood plains and alluvial fans. The soils of this site are moderately deep to very deep and have a surface layer of sandy loam, fine sandy loam, or loamy fine sand. Many of the areas consist of saline-alkali soils or of strongly saline-alkali soils. Some of the soils are eroded.

Permeability is moderate to slow in these soils. Available water capacity is 4.0 to 10.0 inches and fertility is low to high. Much of this site is now cultivated or is fenced into small pastures. Many of the areas have been drained by ground water pumping.

Predominant on this site are plants that tolerate salts and alkali, such as saltgrass, pickleweed, alkali heath, and iodine bush. Red brome, soft chess, cutleaf filaree, and other annuals occur and are abundant in years of above average rainfall. In many places this site is adjacent to and merges into basin areas where the soils are severely affected by salts and alkali and only alkali blite, iodine bush, and plants that tolerate excess salts will grow.

Soils of this site respond to seeding or other range management, especially where saline-alkali reclamation and drainage have been accomplished.

In areas not fertilized and where management is not otherwise improved, estimated annual production of air-dry forage is 500 pounds per acre in years of favorable moisture and 100 pounds in years of unfavorable moisture. Total annual yields can be increased two to four times by adding fertilizer and improving management.

SILTY BASIN SITE

Soils of this range site are in the northwestern, western, and central parts of the survey area in Land Resource Area 19. They consist of moderately deep to very deep soils of the Chino, Domino, Waukena, and Willows series. These soils have a surface layer of silt loam, loam, or silty clay. Some of the soils are saline-alkali and others are strongly saline-alkali.

Permeability of these soils is moderate to slow. Available water capacity is 5.0 to 11.0 inches and fertility is low to high. Most of this site is now in crops or irrigated pasture. Much of the acreage has been drained by ground water pumping.

The predominant plant cover on this site is similar to that on the Sandy Basin site. Annual grasses and forbs, however, seldom are abundant on this site, even in years of above-average rainfall. Soils of this site respond to seeding or other range management, especially if saline-alkali reclamation and drainage have been accomplished.

In areas not fertilized and where management is otherwise not improved, estimated annual production of air-dry forage on this site is 200 pounds per acre in years of favorable moisture and 50 pounds in years of unfavorable moisture. Total annual yields can be increased two to four times by adding fertilizer and improving management.

CIENEGA SITE

This range site consists of soils in valleys in the southeastern part of the survey area in Land Resource Area 20. Only Bishop silt loam and the land type Wet alluvial land are in this site. They are nearly level to strongly sloping and occupy meadowland, where the water table is seasonally high. These soils are somewhat poorly drained to poorly drained and are slightly saline-alkali to strongly saline-alkali. Potential productivity is high because of the high water table.

Permeability is moderate to moderately slow. Available water capacity is 9.0 to 10.0 inches and fertility is low.

When the range has been depleted under heavy grazing or any other disturbance, the perennial grasses decrease and sedges and wire rush increase. The wire rush finally dominates. Annual grasses and forbs, particularly cutleaf filaree, are abundant. Thistle and other undesirable weeds also infest depleted areas.

The plant composition and its productivity are dependent upon the water table. When the water table is lowered by gullying, by drought, or by pumping from wells, the cienega vegetation disappears and is replaced by plants similar to those of the Loamy Uplands site. Big sagebrush commonly invades when the water table has been lowered.

The soils of this site respond to seeding of adapted perennial grasses. Competition from wiregrass is severe, however, and careful preparation of the seedbed is necessary. In many places gully control is needed for control of erosion and to help maintain or restore the water table.

In areas not fertilized and where management otherwise is not improved, estimated annual production of air-dry forage is 4,000 pounds per acre in years of favorable moisture and 1,200 pounds in years of unfavorable moisture. Total annual yields can be increased two to four times by adding fertilizer and improving management.

COARSE SANDY SITE

Soils of this range site are in the eastern part of the survey area on valley bottoms or on alluvial fans and uplands in Land Resource Area 20. Elevations range from 3,500 to 7,000 feet, and rainfall ranges from 13 to 25 inches. These soils are in the Crouch and Mottsville series. They are moderately deep to very deep, nearly level to

strongly sloping loamy sands and sandy loams. Some of these soils are rocky or gravelly, and many are eroded or are severely eroded.

Permeability of the soils in this site is rapid. The available water capacity is 1.5 to 7.5 inches and fertility is low.

The potential plant cover on this site consists of open stands of goldenbush, big sagebrush, ceanothus, and other shrubs. The understory is made up of open stands of wild oats, soft chess, filaree, red brome, cheatgrass, and other grasses. In places needlegrass and other perennial grasses are abundant.

When the range has been depleted through heavy grazing, the more desirable plants decrease and are replaced by such less desirable plants as red brome, cheatgrass, and annual weeds. Because the soils of this site are droughty, response to seeding and brush control is marginal.

In areas not fertilized and where management is otherwise not improved, estimated annual production of air-dry forage is 1,000 pounds per acre in years of favorable moisture and 200 pounds per acre in years of unfavorable moisture. Where rainfall is even lower, as low as 10 to 14 inches, production is reduced to about half these figures. Total annual yields can be increased 1½ to 2 times by adding fertilizer and improving management.

LOAMY UPLANDS SITE

Soils of this range site occur in the northeastern, east-central, and southwestern parts of the survey area in Land Resource Area 20. Elevations are more than 3,500 feet. Rainfall ranges from 11 to 30 inches annually. These soils are in the Anza, Bull Trail, Calpine, Crafton, Crouch, and Oak Glen series. They are moderately deep to very deep, and are gently rolling to moderately steep or hilly. Many of the soils are eroded or severely eroded, and some of them are rocky or are gravelly.

Permeability of these soils is slow to rapid. Available water capacity is 2.0 to 10.0 inches and fertility is low to high.

The plant cover on this site consists of scattered oak trees and grasses and of a few patches of open to dense stands of oak and grass. In places, at higher elevations, the scattered Jeffrey pines occur in the cover. Such desirable plants as wild oats, soft chess, ryegrass, cutleaf filaree, and annual clovers are dominant in most places. In places, however, needlegrass, deergrass, pine bluegrass, blue wildrye, and other perennial grasses predominate.

When the range has been depleted through heavy grazing, the desirable grasses decrease and such less desirable and undesirable plants as ripgut brome, red brome, nitgrass, lupine, and weedy annuals increase. When the range is depleted through fire, white and black sage, flattop buckwheat, chamise, and other brushy plants replace the grass cover. The soils of this site respond to brush control and seeding.

In areas not fertilized and where management is otherwise not improved, estimated annual production of air-dry forage is 1,800 pounds per acre in years of favorable moisture and 600 pounds per acre in years of unfavorable moisture. In areas where rainfall is as little as 10 to 14 inches annually, the production is about half of these figures. Total annual yields can be increased two to three times by adding fertilizer and improving management.

SHALLOW LOAMY UPLANDS SITE

Soils of this range site are in the northeastern, east-central, and southwestern parts of the survey area in Land Resource Area 20. Elevations are more than 3,500 feet. Precipitation ranges from 14 to 25 inches. This site consists of sandy loams and fine sandy loams of the Sheephead and Tollhouse series. These soils are shallow to moderately deep and are moderately steep to very steep. They are eroded and are rocky or stony in places.

Permeability of these soils is rapid to moderate. Available water capacity is 1.0 to 3.0 inches and fertility is low to moderate.

The potential plant cover is open to dense stands of brush, such as ceanothus, scrub oak, manzanita, sugar bush, and other kinds of chaparral. Predominant in the open understory are such desirable grasses as wild oats and soft chess. Cutleaf filaree is abundant in years of favorable rainfall. In places perennial grasses, such as needlegrass and junegrass, are predominant.

When the range has been depleted through heavy grazing, fire, or any other reason, desirable grasses decrease and are replaced by such less desirable and undesirable plants as red brome, nitgrass, poverty fescue, and annual legumes. Brushy cover also increases, in particular those species that are not browsed. Areas burned have almost pure stands of chamise and little or no herbaceous understory. Practices for improving range are not suited to these soils. Brush control and seeding are useful only for control of erosion and for protection from fire.

Total annual production of air-dry forage on this site is 800 pounds per acre in years of favorable moisture and 200 pounds in years of unfavorable moisture.

Wildlife

Game and fish are important in the Western Riverside Area primarily for the recreational opportunities they provide the Area and adjacent heavily populated areas. The soils used for these purposes range from fine-textured soils of the lake bottoms to coarse-textured soils of the uplands. Some farmers are finding that such soils as the Cieneba and the severely eroded Cajalco and Fallbrook can be used more profitably as campsites for tents and trailers than for farming. When the soils are used for recreational purposes, the wildlife inhabiting the areas are an asset to the farmer.

The chief kinds of game hunted in this survey area are waterfowl, valley quail, mourning doves, pheasant, rabbits, and deer. Trout, bluegill, and bass are among the fish taken in the streams, lakes, and ponds of the Area.

Waterfowl.—Several duck clubs are in the Area, chiefly on such saline-alkali soils as Traver, Willows, and Waukena. Use of such soils for wildlife habitat, or for water sports, probably is the best use for these soils unless the soils are reclaimed. Shallow ponds generally can be built with a minimum of land leveling and by constructing contour levees around old fields. Plants that are salt tolerant, such as alkali bulrush and Japanese millet, can be grown in summer for duck food. Then the fields can be flooded during the fall and winter for duck hunting.

[4] By JOHN R. REID, soil conservationist, Soil Conservation Service.

Among the waterfowl from the Pacific Flyway that stop over to use the ponds and reservoirs in the Area are Canadian honkers, snow geese, mallards, green-winged teal, and sprigs or pintail.

Quail.—The valley quail is the primary game bird in the uplands. Quail frequent riverwashes, brushland, and grain areas adjacent to brushland. The soils in these areas typically are moderately coarse textured to coarse textured, such as the Cieneba, Friant, Tujunga, and Vista. They support buckwheat and sagebrush cover, as well as some coyote brush in the washes. The cover generally is interspersed with openings that support annual forbs and grasses that furnish food for the quail. Additional food is available to the quail from the adjacent cultivated fields.

Opening the dense stands of brush provides more area to produce food for quail and generally improves the quail habitat. Installing watering devices, such as "guzzlers" on droughty Cieneba, Fallbrook, and Vista soils also improves the habitat for quail. Where dryfarmed grainfields in the uplands have been converted to citrus, the quail population has increased. The citrus groves provide food and habitat for the quail, as well as sufficient water.

Mourning doves.—The mourning dove is a fairly important game bird in the Western Riverside Area. It inhabits the grainfields, feeds on dove weed and wasted grain, and nests in nearby orchards and brushland. The soils suited to dove habitat are similar to those suited to quail habitat.

Pheasant.—The pheasant is one of the most sought after game birds in the Area. Pheasants are stocked on a "put and take basis," because they generally do not reproduce naturally. The hens breed and lay eggs. The eggs, however, do not hatch well because the humidity in the Area generally is too low. The best hatching success occurs when the birds nest in alfalfa fields. A considerable number of birds are killed, however, and many of the nests are destroyed when mowing is done. Some increase in the wild pheasant population is likely as more private clubs are formed by game breeders and they maintain good cover for the birds.

Rabbits.—One of the most common wildlife species in the Area is the rabbit. Rabbits frequent the riverwashes, brushland, and grainfields adjacent to irrigated land. They are most abundant on soils of the Dello, Grangeville, Greenfield, Hanford, Tujunga, and Vista series. Rabbit hunting is encouraged in areas where rabbits are so numerous they are a problem to the farmer.

Deer.—Deer live in brushland on the Fallbrook, Friant, and Vista soils. Occasionally they damage crops and become a hazard to farmers. Firebreaks and browseways break up large stands of brush and improve the habitat for deer.

Fish.—Many ponds scattered throughout the Area are stocked with trout, bluegill, and bass. In 1963, seven commercial fish pond operators in the Area furnished fishing for a fee. Three of these operators stocked their ponds with trout which require a constant source of cool water at temperatures of 70°F. or cooler. New lining methods permit fish ponds to be built on all but the most porous soils.

Several water ski areas are located in the Western Riverside Area. They are used for water skiing only; no fishing is permitted.

Engineering Uses of the Soils[5]

Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, and pipelines, the foundations of buildings, facilities for storing water, structures for controlling erosion, drainage systems, and systems for disposing of sewage. The properties most important to the engineer are permeability, shear strength, compaction characteristics, soil drainage, shrink-swell characteristics, particle size, plasticity, and reaction. Also important are depth to water table, flooding hazard, depth to bedrock, to a hardpan, or to sand and gravel, and relief. Such information is made available in this section. Engineers can use this information to—

1. Make soil and land use studies that will aid in selecting and developing sites for industries, businesses, residences, and recreational areas.
2. Make preliminary estimates of the engineering properties of soils in the planning of agricultural drainage systems, farm ponds, irrigation systems, land leveling, and diversion terraces.
3. Make preliminary evaluations of soil conditions that will aid in selecting locations for highways, airports, pipelines, and cables, and in planning more detailed surveys for the selected locations.
4. Locate probable sources of sand, gravel, and other materials suitable for construction needs.
5. Correlate performance of engineering structures with mapping units to develop information for general planning that will be useful in designing and maintaining certain engineering practices and structures.
6. Determine the suitability of the soils for cross-country movement of vehicles and construction equipment.
7. Supplement information obtained from other published maps and reports and aerial photographs.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

It should be emphasized that the interpretations made in this soil survey may not eliminate the need for sampling and testing needed at a site chosen for a specific engineering work that involves heavy loads or at a site where excavations are to be deeper than the depths of the layers here reported. Also, engineers should not apply specific values to the estimates for bearing capacity given in this survey. Nevertheless, by using this survey, an engineer can select and concentrate on those kinds of units most important for his proposed kind of construction, and in this manner, reduce the number of samples taken for laboratory testing and complete an adequate soil investigation at minimum cost.

The soil mapping units shown on the maps in this survey may include small areas of a different soil material. These included soils are too small to be mapped separately and generally are not significant to the agriculture in the Area but may be important in engineering planning.

[5] By WARREN D. BENNETT, civil engineer, Soil Conservation Service.

Information of value in planning engineering work is given throughout the text, particularly in the sections "Descriptions of the Soils" and "Formation, Morphology, and Classification of Soils."

Some of the terms used by the soil scientist may be unfamiliar to the engineer, and some words—for example, soil, clay, silt, and sand—may have a special meaning in soil science. These and other special terms used in the soil survey are defined in the Glossary at the back of this survey. Most of the information about engineering is given in tables 4, 5, and 6.

Engineering classification systems

Most highway engineers classify soil material according to the system approved by the American Association of State Highway Officials (AASHO) (*1*). In this system soil materials are placed in seven principal groups based on field performance. The groups range from A–1, consisting of gravelly and coarse sandy soils of high bearing capacity, to A–7, consisting of clayey soils having low strength when wet.

Some engineers prefer to use the Unified soil classification system developed by the U.S. Army, Corps of Engineers (*15*). This system is based on the texture and plasticity of soils and the performance of soils as material for engineering works. In this system soil materials are classified as coarse grained (eight classes), fine grained (six classes), or highly organic (one class). An approximate classification can be made in the field. Table 4 shows the classification of the tested soils according to the AASHO and Unified systems.

Engineering test data

Table 4 gives test data for samples of selected layers taken from the profiles of some extensive soils of the survey area. The samples were taken in representative sites. Most of the soils were tested in the laboratory of the California Division of Highways, but some were tested by the Bureau of Public Roads (BPR). The data in the table show the classification of the samples under the AASHO and Unified systems. They also show the moisture density, mechanical analyses, liquid limit, and plasticity index.

In the *moisture-density*, or compaction test, a sample of the soil material is compacted several times with a constant compactive effort, each time at a successively higher moisture content. The moisture content increases until the optimum moisture content is reached. After that the density decreases with increase in moisture content. The highest density obtained in the compaction test is termed "maximum density." Moisture-density data are important in construction, for as a rule, optimum stability is obtained if the soil is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

The results of the mechanical analysis may be used to determine the relative proportions of the different size particles that make up the soil sample.

The tests for liquid limit and plastic limit measure the effect of water on consistence of the soil material. As the moisture content of a clayey soil increases from a very dry state, the material changes from a semisolid to a plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The *plastic limit* is the moisture content at which the soil material passes from a semisolid to a plastic state. The *liquid limit* is the moisture content at which the soil material passes from a plastic to a liquid state. The *plasticity index* is the numerical difference between liquid limit and plastic limit. It indicates the range in moisture content within which a soil material is in a plastic condition.

Engineering properties

Table 5 lists the soil series in the survey area, lists the map symbols for each mapping unit, and gives estimates of soil properties significant to some engineering work.

Given in table 5 are the depth to weathered or hard bedrock or a hardpan, depth to seasonal high water table, and the estimated USDA, Unified, and AASHO classifications. In addition estimates of the percentages of material passing through the various sieves are given. Also shown are estimates of Atterberg values, permeability, available water capacity, reaction, salinity, and shrink-swell potential. The estimates are based partly on examinations made in the field and partly on results of test data shown in table 4. Since the estimates are only for typical soils, considerable variation from these values should be anticipated. More information on the range of properties of the soils can be obtained in other parts of this survey, particularly in the section "Descriptions of the Soils."

Depth to bedrock or to a hardpan, expressed in feet, gives the observed or estimated range of depth from the surface to weathered or unweathered bedrock or hardpan.

Depth to seasonal high water table, expressed in feet, gives the observed or estimated range of depth from the surface to the shallowest level reached by a seasonal water table.

The columns headed "Percentage passing sieve" list the estimated range in percentage of material passing sieve numbers 4, 10, and 200. It should not be assumed that all samples of a specific soil will fall within the range of the typical profile shown or that the engineering classification will be the same as shown. The range of estimated physical properties is broad for some of the soils, and as a result the soils may be in several classification groups.

Soil permeability is the ability of a soil to transmit air or water. The rates given in table 5 are for the soils as they occur in place.

Available water capacity, expressed in inches per inch of soil depth, is the capacity of a soil to retain water that can be readily absorbed by plants. It is the estimated amount of water held in a soil between field capacity and the permanent wilting point of plants.

Reaction as shown in table 5 is the estimated range in pH values for each major horizon as determined in the field. It indicates the acidity or alkalinity of the soils. A pH of 7, for example, indicates a neutral soil, a lower pH value indicates acidity, and a higher value indicates alkalinity.

Salinity of a soil is based on the electrical conductivity of saturated soil extract as expressed in millimhos per centimeter at 25° C. Values less than 4 indicate a soluble salt content of less than 0.3 percent by air-dry weight of soil.

The shrink-swell potential refers to the change in volume of the soil that results from a change in moisture content. It is estimated on the basis of the amount and

TABLE 4.—

Soil name and location	Parent material	Report No.[1]	Depth	Maximum dry density	Optimum moisture	Mechanical		
						Percentage		
						3-in.	¾-in.	No. 4 (4.7 mm.)
			Inches	*Lb. per cu. ft.*	*Percent*			
Arbuckle gravelly loam: 800 feet W. and 200 feet S. of E¼ corner, sec. 31, T. 3 S., R. 6 W.	Pleistocene alluvial deposits.	62—163	0—12	129	9	100	99	91
		62—165	12—26	132	11	100	95	89
		62—166	26—45	140	8	100	87	61
		62—164	45—68	140	8	100	93	58
Arlington loam: 50 feet E. and 220 feet S. of Mary St. and Victoria Ave., SE¼, sec. 3, T. 3 S., R. 5 W.	Pleistocene alluvial deposits.	62—175	0—9	130	9	—	—	100
		62—176	13—23	134	10	—	100	99
		62—177	28—37	139	7	—	100	95
Cajalco fine sandy loam: 700 feet E. and 400 feet N. of SW corner, sec. 36, T. 4 S., R. 5 W.	San Marcos gabbro.	62—178	0—8	128	11	—	—	100
		62—179	23—31	127	12	—	—	100
Hanford coarse sandy loam: 1,000 feet S. and 1,200 feet W. of E¼ corner, sec. 30, T. 3 S., R. 2 W.	Recent granitic alluvium.	62—174	17—37	133	8	—	100	98
Placentia fine sandy loam: 1,000 feet N. of Calif. Hwy. 71 on W. side of U.S. Hwy. 395.	Pleistocene alluvial deposits.	62—167	0—18	124	10	—	—	100
		62—168	18—31	124	13	—	—	—
		62—170	39—57	127	12	—	—	—
Ramona sandy loam: 1,100 feet N. and 500 feet W. of SW¼ corner, sec. 31, T. 2 S., R. 1 W.	Alluvium.	62—171	14—23	131	8	—	100	99
		62—172	37—46	132	11	—	100	99
		62—173	68—74	129	12	—	100	98
San Emigdio fine sandy loam: 800 feet E. and 50 feet S. of NW corner, sec. 16, T. 3 S., R. 2 W.	Alluvium from San Timoteo Badlands.	62—169	22—42	131	9	—	100	96
Vista coarse sandy loam: On E. side of Hwy. R3 in NW¼, sec. 18, T. 7 S., R. 1 E.	Granodiorite.	S 31058	1—9	120	11	—	—	100
		S 31059	15—24	126	10	—	—	100
		S 31060	24—30	125	11	—	100	98
Willows silty clay: 200 feet N. of S¼ corner, sec. 33, T. 4 S., R. 3 W. On Rynsberger Ranch in the triangle between Ellis Road, U.S. Highway 395 and San Jacinto River.	Mixed alluvium.	S 32473	0—6	95	25	—	—	—
		S 32474	10—24	97	25	—	—	—
		S 32475	42—60	96	25	—	—	—

[1] Tests for all except Willows and Vista soils performed by District VIII, California Division of Highways in accordance with procedures given in "California Materials Manual for Testing and Control Procedure;" tests for Willows and Vista soils performed by Bureau of Public Roads (BPR), reports dated April 22, 1957 and June 9, 1958.

[2] Based on California Division of Highways: Method No. 216 E.

[3] Mechanical analyses by the California Division of Highways (*3*), Methods No. 202 and 203. Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the California procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine

Engineering test data

analysis [3]							Liquid limit	Plasticity index	Classification	
passing sieve—			Percentage smaller than—							
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO[4]	Unified[5]
83	71	55	37	24	13	10	(6)	(6)	A—4(4)	ML
84	76	63	33	23	16	12	25	11	A—6(6)	CL
51	37	25	22	16	13	10	24	12	A—2—6(0)	GC
41	21	10	10	8	7	6	23	8	A—2—4(0)	SW—SC
99	88	71	47	30	20	16	24	5	A—4(7)	ML—CL
93	73	57	44	24	16	12	26	10	A—4(4)	CL
80	50	29	23	14	9	6	(6)	(6)	A—2—4(0)	SM
99	80	33	25	18	13	11	(6)	(6)	A—2—4(0)	SM
99	85	48	42	31	23	20	29	13	A—6(4)	SC
86	44	18	17	10	7	5	(6)	(6)	A—1—b(0)	SM
99	91	61	46	24	15	12	(6)	(6)	A—4(5)	ML
100	95	76	64	49	40	36	35	23	A—6(13)	CL
100	95	68	52	37	28	25	29	15	A—6(9)	CL
96	77	49	38	28	18	13	(6)	(6)	A—4(3)	SM
96	79	51	44	34	25	20	24	10	A—4(3)	CL
92	73	41	36	29	22	18	29	13	A—6(2)	SC
93	85	39	34	22	12	8	(6)	(6)	A—4(1)	SM
97	75	37	31	24	11	8	(6)	(6)	A—4(0)	SM
90	65	32	28	20	13	10	25	3	A—2—4(0)	SM
77	35	12	10	7	5	4	(6)	(6)	A—1—6(0)	SW—SM
—	100	98	96	87	66	46	52	23	A—7—6(16)	MH—CH
—	100	99	97	90	73	58	66	35	A—7—5(20)	MH—CH
100	99	98	(7)	(7)	(7)	(7)	66	35	A—7—5(20)	MH—CH

material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

[4] Based on American Association of Highway Officials Designation: M145—49(*1*).

[5] Based on the Unified soil classification system (*15*), Tech. Memo. No. 3—357. SCS and BPR have agreed to consider that all soils having plasticity indexes within two points from A-line are to be given a borderline classification. Examples of borderline classification obtained by this use are MH—CH, ML—CL, SW—SC, and SW—SM.

[6] Nonplastic.

[7] Flocculated.

TABLE 5.—

[Absence of information indicates a determination was not made or that it would not be applicable. Not included in this table, (RsC), Rock land (RtF), Rough broken land (RuF), Terrace

Soil series and map symbols	Depth to— Bedrock or hardpan	Depth to— Seasonal high water table	Depth from surface (typical profile)	Classification: USDA texture	Classification: Unified	Classification: AASHO	Percentage: Larger than 3 inches	Percentage: No. 4 (4.7 mm.)
	Feet	*Feet*	*Inches*					
Altamont: AaD, AaE2, AaF, AbF.	1½—3	(1)	0—23	Clay; cobbly in places.	CH, MH	A—7	100	90—100
			23	Soft sandstone.				
Anza: AcC, AdA, AdC.	>5	>5	0—69	Fine sandy loam.	SM, ML	A—4	100	100
Arbuckle:								
AkC, AkD	>5	(1)	0—26	Loam	ML, CL	A—4	100	95—100
			26—45	Clay loam	CL	A—6	100	95—100
			45—68	Very gravelly sandy loam.	GM, SM	A—2	80—95	50—60
AlC, AlD, AlE, AlE3, AmC.	>5	(1)	0—26	Gravelly loam	GM, SM	A—2	95—100	65—85
			26—45	Gravelly clay loam.	GM, SM	A—4	90—100	70—90
			45—68	Very gravelly sandy loam.	GM, SM	A—2	80—95	50—60
Arlington: AnC, AnD, AoA, AoC, AoD, ApB, ArB, ArD, AtC2, AtD2, AtF3. (For properties of Greenfield soils in mapping units AtC2, AtD2, and AtF3, refer to Greenfield series in this table.)	5	(1)	0—24 (36 in places)	Loam	ML, CL	A—4, A—6	100	100
			24—36 (36—54 in places)	Weakly cemented sandy loam.	SM	A—2	95—100	90—100
			36—60	Loamy coarse sand.	SP, SM	A—1	100	100
Auld:								
AuC, AuD	2½—5	(1)	0—28	Clay	CH, MH	A—7	100	100
			28—44	Loam	CL	A—6	100	100
			44	Weathered basic igneous rock.				
AyF	2½—5	(1)	0—24	Cobbly clay	CH, MH	A—7	65—85	65—85
			24—40	Cobbly loam ...	CL	A—4	65—85	50—65
			40	Weathered basic igneous rock.				
Bishop: Bb	>5	1½—5	0—14	Silt loam	ML	A—4, A—6	100	100
			14—64	Stratified fine sandy loam to silty clay loam.	ML, CL	A—4, A—6	100	100
Bonsall: BdC, BdD ..	2—4½	(1)	0—13	Loam	ML	A—4	100	100
			13—30	Clay	CL, CH	A—7	100	100
			30	Tonalite.				
Bosanko: BfC, BfD ..	2—3	(1)	0—32	Clay	CL, MH	A—7	100	100
			32	Weathered acid igneous rock.				
Buchenau: BhA, BhC, BkC2.	2—4½	(1)	0—52	Loam	CL, ML	A—4, A—6	100	100
			52—61	Hardpan strongly cemented with lime.	....	....	....	....

Estimated properties

because their characteristics are too variable for engineering use, are the land types Badland (BaG), Gullied land (GzG), Riverwash escarpments(TeG), and Wet alluvial land (WeD), < = more than]

passing sieve—			Atterberg values		Permeability	Available water capacity	Reaction	Salinity[1]	Shrink-swell potential
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Liquid limit	Plastic index					
					Inches per hour	*Inches per inch of soil*	*pH value*	*Mmhos/cm at 25° C.*	
90–100	90–100	75–85	55–70	35–45	0.06–0.2	[2]0.14–0.16	6.1–8.4	< 1	High.
90–100	70–85	45–60	....	(3)	2.0–6.3	0.13–0.15	6.1–8.4	< 1	Low.
90–95	70–85	50–65	15–35	5–10	0.63–2.0	0.16–0.18	6.1–7.3	< 1	Moderate.
90–95	75–85	70–80	20–30	10–20	0.2–0.63	0.17–0.19	6.6–7.8	< 1	Moderate.
40–50	20–30	5–15	15–25	5–10	0.63–2.0	0.06–0.08	6.6–7.3	< 1	Low.
60–80	55–65	25–35	15–35	5–10	0.63–2.0	0.11–0.13	6.1–7.3	< 1	Low.
65–85	60–75	35–50	20–30	10–20	0.2–0.63	0.12–0.14	6.6–7.8	< 1	Moderate.
40–50	20–30	5–15	15–25	5–10	0.63–2.0	0.06–0.08	6.6–7.3	< 1	Low.
95–100	60–70	55–75	20–30	5–15	0.63–2.0	0.15–0.17	6.1–7.8	< 1	Moderate.
75–85	40–50	25–35	....	....	0.06–0.2	....	....	< 1	Low.
95–100	40–50	10–20	....	(3)	> 20	0.06–0.08	6.6–7.3	< 1	Low.
95–100	90–95	70–90	50–75	20–45	0.06–0.20	0.14–0.16	6.6–8.4	< 1	High.
100	75–85	60–75	25–35	10–20	0.63–2.0	0.16–0.18	7.9–8.4	< 1	Moderate.
60–85	55–65	50–65	50–75	20–45	01.06–0.20	0.08–0.10	6.6–8.4	< 1	Moderate.
50–65	40–50	30–40	20–30	5–10	01.63–2.0	0.09–0.11	7.9–8.4	< 1	Low.
100	90–100	70–90	35–45	10–15	0.63–2.0	0.18–0.20	7.9–8.4	1–8	Moderate.
100	95–100	75–95	30–40	5–25	0.2–2.0	0.16–0.20	7.9–8.4	4–15+	Moderate.
95–100	85–95	60–75	10–20	0–10	2.0–6.3	0.16–0.18	5.6–6.0	< 1	Low.
100	60–80	70–90	40–60	25–35	< 0.06	0.04–0.06	6.6–8.4	1–4	High.
100	85–95	65–75	35–60	15–35	01.06–2.0	0.14–0.16	5.6–7.8	< 1	High.
100	85–95	65–85	15–35	5–20	0.2–0.63	0.16–0.18	7.9–8.4	0–8	Moderate.
....	....	....	....	....	< 0.06	....	8.5–9.0	....	

TABLE 5.—*Estimated*

Soil series and map symbols	Depth to— Bedrock or hardpan	Seasonal high water table	Depth from surface (typical profile)	Classification USDA texture	Unified	AASHO	Percentage Larger than 3 inches	No. 4 (4.7 mm.)
	Feet	*Feet*	*Inches*					
Bull Trail: BsC2, BsD2, BsE3, BtD2, BtE3.	>5	(1)	0—22	Coarse sandy clay loam; stones on surface in places.	SC	A—4	100	100
			22—55	Coarse sandy loam.	SM	A—2	95—100	70—90
			55—60	Weakly cemented fine sandy loam.	SM	A—2	100	100
Buren: BuC2, BuD2, BvD3, BxC2.	>5	(1)	0—37	Clay loam	CL	A—6	100	100
			37—52	Weakly cemented loam.	ML	A—4	100	100
Cajalco: CaC2, CaD2, CaF2, CbD2, CbF2.	1½—4	(1)	0—13	Fine sandy loam.	SM	A—2	100	100
			13—22	Loam	SC	A—6	100	100
			22	Weathered gabbro.				
Calpine: CcC2, CcD2, CdC2.	>5	(1)	0—33	Sandy loam and loam.	SM	A—2, A—4	95—100	90—100
			33—60	Loamy coarse sand.	SM	A—1	95—100	90—100
Chino: Ce, Cf, Cg	>5	1½—5	0—60	Silty clay loam	CL	A—6	100	100
Cieneba: ChC, ChD2, ChF2, CkD2, CkF2.	1—2	(1)	0—22	Gravelly coarse sandy loam.	SM, GM	A—1, A—2	90—100	70—90
			22	Weathered granodiorite.				
Cortina: ClC, CmC, CnC, CoA, CpA, CrD.	>5	(1)	0—60	Cobbly and gravelly loamy sand and sandy loam.	GM	A—1	50—60	40—50
Crafton: CsF2, CtF2, CuE.	2—3	(1)	0—26	Sandy loam	SM	A—2	95—100	90—100
			26	Mica-schist.				
Crouch: CvD2, CwD2, CwE2, CyE2, CyF2.	2—4	(1)	0—28	Sandy loam	SM	A—2	95—100	90—100
			28	Weathered granite.				
Delhi: DaD2, DbA ...	>5	(1)	0—64	Fine sand and loamy fine sand.	SM	A—2	100	100
Dello:								
DgB, DmA, DoA, DpB.	>5	1—4	0—62	Loamy fine sand, loamy sand, and sand.	SM	A—2	100	100
DnB, DrA	>5	3—4	0—24	Loamy fine sand and loamy sand.	SM	A—2	100	100
			24—60	Gravelly sand ..	SW, GW	A—1	90—100	70—80
Domino: Ds2, Dt, Du, Dv, Dw.	1½—3½	2½—5	0—27	Silt loam	ML, CL	A—4	100	100
			27—36	Loam, weakly to strongly cemented with lime.	ML, CL	A—4	100	100
			36—63	Loam	ML, CL	A—4	100	100

properties—Continued

passing sieve—			Atterberg values		Permea-bility	Available water capacity	Reaction	Salinity[1]	Shrink-swell potential
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Liquid limit	Plastic index					
					Inches per hour	*Inches per inch of soil*	*pH value*	*Mmhos/cm at 25° C.*	
85–100	55–60	40–50	15–40	5–10	0.2–0.63	0.14–0.16	5.1–6.0	<1	Moderate.
55–70	40–60	25–35	....	([3])	2.0–6.3	0.10–0.12	6.1–7.3	<1	Low.
85–100	45–55	25–35	....	....	0.06	0.10–0.12	6.6–7.3	....	Low.
95–100	90–100	70–80	20–35	15–25	0.2–0.63	0.17–0.19	6.1–8.4	<1	Moderate.
95–100	80–95	50–65	10–25	5–10	<0.06	....	7.9–8.4	....	Low.
95–100	60–75	25–35	....	([3])	2.0–6.3	0.13–0.15	6.1–7.3	<1	Low.
95–100	80–90	40–50	25–35	10–20	0.63–2.0	0.16–0.18	6.6–7.3	<1	Moderate.
85–95	60–70	25–45	....	([3])	2.0–6.3	0.11–0.13	5.6–6.5	<1	Low.
90–100	40–50	10–20	....	([3])	>20.0	0.06–0.08	5.6–6.5	<1	Low.
100	90–100	85–95	30–40	20–35	0.20–0.63	0.19–0.21	7.9–8.4	1–15+	Moderate.
65–85	35–50	15–30	....	([3])	6.3–20.0	0.06–0.08	5.6–6.5	<1	Low.
30–45	25–35	5–10	....	([3])	6.3–20.0	0.05–0.07	6.6–7.8	<1	Low.
85–95	55–65	20–30	....	([3])	2.0–6.3	0.10–0.12	5.6–6.5	<1	Low.
85–95	55–65	20–30	....	([3])	2.0–6.3	0.11–0.13	5.1–6.5	<1	Low.
95–100	65–80	15–35	....	([3])	6.3–20.0	0.08–0.11	5.6–7.3	<1	Low.
90–100	50–75	15–30	....	([3])	2.0–20.0	0.08–0.11	7.4–8.4	0–15	Low.
90–100	50–75	15–30	....	([3])	2.0–6.3	0.08–0.11	7.4–8.4	0–8	Low.
60–80	40–50	0–5	....	([3])	>20.0	0.05–0.07	7.4–8.4	0–8	Low.
100	90–100	70–90	20–35	5–10	0.63–2.0	0.19–0.21	7.9–9.0	4–15+	Moderate.
100	80–95	60–75	15–25	5–10	<0.06	....	7.9–9.0	8–15+	Low.
100	80–90	60–70	15–25	5–10	0.63–2.0	0.16–0.18	7.9–9.0	8–15+	Low.

TABLE 5.—*Estimated*

Soil series and map symbols	Depth to— Bedrock or hardpan	Depth to— Seasonal high water table	Depth from surface (typical profile)	Classification: USDA texture	Classification: Unified	Classification: AASHO	Percentage: Larger than 3 inches	Percentage: No. 4 (4.7 mm.)
	Feet	*Feet*	*Inches*					
Escondido: EcC2, EcD2, EcE2, EfF2.	2—4	(1)	0—34	Very fine sandy loam.	ML	A—4	100	100
			34	Sandstone.				
Exeter: EnA, EnC2, EoB, EpA, EpC2, EwB, EyB.	1½—4½	(1)	0—16	Sandy loam and very fine sandy loam.	SM, ML	A—4	100	100
			16—37	Loam	ML, CL	A—4	100	100
			37—50	Indurated hardpan.	...	...	...	...
			50—60	Coarse sandy loam.	SM	A—2	100	100
Fallbrook: FaD2, FaE2, FbC2, FbF2, FcD2, FcF2, FfC2, FkD2.	1—3	(1)	0—14	Sandy loam	SM	A—2	100	95—100
			14—24	Sandy clay loam	SC	A—6	100	95—100
			24	Weathered granite.				
Friant: FwE2, FyE2, FyF2.	1—1½	(1)	0—13	Fine sandy loam.	SM	A—4	100	95—100
			13	Mica-schist.				
Garretson: GaA, GaC, GaD2	>5	(1)	0—60	Very fine sandy loam.	ML	A—4	100	95—100
GdA, GdC, GdD2	>5	(1)	0—60	Gravelly very fine sandy loam and loam.	ML, SC	A—4	95—100	75—85
Gaviota: GeG3, GfF2, GgF2.	1—1½	(1)	0—15	Very fine sandy loam or fine sandy loam.	ML, SM	A—4	100	100
			15	Weathered sandstone.				
Gorgonio: GhC, GhD, GkD, GlC.	>5	(1)	0—20	Loamy sand	SM	A—2	100	95—100
			20—60	Gravelly loamy sand.	GM	A—1	80—100	60—80
GmD, GnD	>5	(1)	0—60	Gravelly or cobbly loamy sand.	GM	A—1	75—90	55—70
Grangeville: GoB, GpB, GuB	>5	1½—5	0—60	Loamy fine sand and fine sandy loam.	SM	A—4	100	100
GrB, GsB	>5	(1)	0—36	Sandy loam	SM	A—4	100	100
			36—60	Loamy coarse sand and coarse sand.	SP, SM	A—2	100	90—100
GtA, GtD, GvB, GwA, GxA.	>5	3—5	0—36	Fine sandy loam.	SM, ML	A—4	100	100
			36—64	Loam	ML, CL	A—4	100	100
Greenfield: GyA, GyC2 GyD2, GyE2.	5	(1)	0—43	Sandy loam	SM	A—2	100	100
			43—60	Loam	ML, CL	A—4	100	100
Hanford: HaC, HcA, HcC, HcD2, HeC2, HfD, HgA.	>5	(1)	0—40	Coarse sandy loam.	SM	A—2	100	90—100
			40—60	Loamy sand and gravelly coarse sand.	SP, SM	A—1	90—100	70—100

properties—Continued

passing sieve			Atterberg values		Permea-bility	Available water capacity	Reaction	Salinity[2]	Shrink-swell potential
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Liquid limit	Plastic index					
					Inches per hour	*Inches per inch of soil*	*pH value*	*Mmhos/cm at 25° C.*	
100	85—95	50—65	15—35	5—10	0.63—2.0	0.15—0.17	5.6—6.5	<1	Low.
95—100	60—80	35—60		(3)	2.0—6.3	0.11—0.13	5.6—6.5	1—5	Low.
95—100	85—95	50—70	15—30	5—10	0.63—2.0 <0.06	0.16—0.18	6.6—8.4 7.4—9.0	1—8	Moderate.
90—100	60—70	25—35			2.0—6.3	0.11—0.13	7.4—8.4	1—4	Low.
75—80 90—100	50—60 80—90	15—35 35—50	 20—30	(3) 10—20	2.0—6.3 0.63—2.0	0.11—0.13 0.14—0.16	6.1—7.3 6.6—7.3	<1 <1	Low. Moderate.
85—95	80—90	35—50		(3)	2.0—6.3	0.13—0.15	5.6—7.3	<1	Low.
90—100	75—85	50—65	15—35	5—10	0.63—2.0	0.15—0.17	6.1—7.3	<1	Low.
65—80	50—65	40—60	15—30	5—10	0.63—2.0	0.10—0.12	6.1—7.3	<1	Low.
90—100	75—90	40—60		(3)	0.63—2.0	0.11—0.15	6.1—7.3	<1	Low.
85—95 50—70	50—75 30—50	10—20 5—10		 (3)	6.3—20.0 6.3—20.0+	0.06—0.08 0.05—0.07	5.6—6.5 5.6—6.0	<1 <1	Low. Low.
45—65	25—40	5—10		(3)	6.3—20.0+	0.05—0.07	5.6—6.5	<1	Low.
100	75—90	40—50		(3)	2.0—6.3	0.10—0.12	7.9—9.0	1—15+	Low.
100 90—90	60—80 50—70	35—45 0—15		(3) (3)	2.0—6.3 20.0+	0.11—0.13 0.06—0.08	7.9—9.0 7.9—9.0	1—15 4—15	Low. Low.
100	70—85	40—55		(3)	2.0—6.3	0.13—0.15	7.9—9.0	1—15+	Low.
100	80—90	55—75	15—35	5—10	0.63—2.0	0.16—0.18	7.9—9.0	1—15+	Low.
90—100 95—100	80—90 80—90	25—35 50—60	 10—25	(3) 5—10	2.0—6.3 0.63—2.0	0.11—0.13 0.16—0.18	6.1—7.3 6.6—7.8	<1 <1	Low. Low.
80—90	60—70	15—25		(3)	2.0—6.3	0.10—0.12	6.1—7.8	<1	Low.
50—75	40—50	0—15		(3)	6:3—20.0	0.06—0.08	6.1—7.8	<1	Low.

TABLE 5.—*Estimated*

Soil series and map symbols	Depth to— Bedrock or hardpan	Depth to— Seasonal high water table	Depth from surface (typical profile)	Classification USDA texture	Classification Unified	Classification AASHO	Percentage Larger than 3 inches	Percentage No. 4 (4.7 mm.)
	Feet	*Feet*	*Inches*					
Hanford—continued								
HdD2	>5	(1)	0–30	Cobbly coarse sandy loam.	SM	A–2	65–85	60–80
			30–60	Loamy coarse sand.	SM	A–2	95–100	85–100
Hilmar:								
HhA2	>5	(1)	0–22	Loamy sand and sandy loam.	SM	A–2, A–4	100	100
			22–72	Loam and clay loam.	ML, CL	A–6	100	100
HlA, HlC	>5	(1)	0–60	Loamy very fine sand.	SM	A–4	100	100
Honcut:								
HnC, HnD2, HoF	>5	(1)	0–60	Sandy loam that is cobbly in places.	SM	A–2	100	95–100
HuC2	>5	(1)	0–60	Loam	ML	A–4	100	100
Las Posas: LaC, LaC2, LaD2, LaE3, LcD2, LkD2, LkF3.	1–4	(1)	0–12	Loam and clay loam.	CL	A–6	100	100
			12–32	Clay	MH, CH	A–7	100	100
			32	Weathered gabbro.				
Lodo: LoF2, LpE2, LpF2.	½–1½	(1)	0–8	Gravelly loam	SM, GM	A–4	95–100	80–90
			8	Shattered sandstone.				
Madera: MaA, MaB2, MaD2, MbC2.	1–3	(1)	0–19	Fine sandy loam.	SM	A–4	100	100
			19–26	Clay	CH, MH	A–7	100	100
			26–37	Indurated hardpan.	...	...	...	...
			37–62	Clay loam and loam.	CL	A–6	100	100
Metz:								
MdC, MeD, MfA, MgB, MlD.	>5	(1)	0–48	Loamy fine sand and loamy coarse sand that is gravelly in places.	SM, GM	A–2	100	100
			48	Sand that is gravelly in places.	SM	A–2	100	100
MhB	>5	(1)	0–30	Loamy fine sand.	SM	A–2	100	100
			30–60	Sandy loam	SM	A–2	100	100
Monserate: MmB, MmC2, MmD2, MmE3, MnD2, MnE3.	1–3	(1)	0–10	Sandy loam	SM	A–4	100	95–100
			10–28	Sandy clay loam.	SC, CL	A–6	100	95–100
			28–45	Indurated hardpan.	...	...	...	...
Mottsville:								
MoC, MoD	>5	(1)	0–60	Loamy sand and loamy coarse sand.	SM	A–2	100	100
MrE, MtE2	>5	(1)	0–24	Cobbly loamy sand or sandy loam.	SM	A–2	75–85	65–80
			24–60	Loamy sand	SM	A–2	100	100

properties—Continued

passing sieve—			Atterberg values		Permea-bility	Available water capacity	Reaction	Salinity[1]	Shrink-swell potential
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Liquid limit	Plastic index					
					Inches per hour	*Inches per inch of soil*	*pH value*	*Mmhos/cm at 25° C.*	
45—60	30—40	10—15	....	(3)	2.0—6.3	0.08—0.10	6.1—7.8	<1	Low.
55—75	50—60	5—15	....	(3)	6.3—20.0	0.06—0.08	6.1—7.8	<1	Low.
90—95	60—80	25—45	....	(3)	2.0—6.3	0.10—0.12	7.9—8.4	0—4	Low.
100	90—100	75—85	30—40	10—30	0.2—0.63	0.18—0.20	7.9—8.4	0—4	Moderate.
100	90—95	35—45	....	(3)	6.3—20.0	0.10—0.12	7.9—8.4	4—8	Low.
90—100	60—70	25—35	....	(3)	2.0—6.3	0.11—0.13	6.1—7.3	<1	Low.
95—100	65—90	50—70	10—35	5—10	0.63—2.0	0.16—0.18	6.1—7.3	<1	Low.
95—100	85—95	60—75	25—35	15—20	0.2—0.63	0.15—0.19	6.1—7.3	<1	Moderate.
100	90—100	75—95	50—60	20—30	0.2—0.63	0.14—0.16	6.6—7.8	<1	High.
50—70	40—60	35—50	0—10	0—5	0.63—2.0	0.10—0.12	5.6—6.5	<1	Low.
100	70—85	35—50	....	(3)	2.0—6.3	0.13—0.15	6.1—7.3	<1	Low.
100	90—100	70—90	55—75	20—45	<0.06	0.14—0.16	7.9—8.4	<1	High.
....	....	....	....	....	<0.06	....	7.9—8.4	....	
95—100	85—95	65—75	20—30	10—20	0.2—0.63	0.17—0.19	8.5—9.0	<1	Moderate.
95—100	50—75	15—25	....	(3)	6.3—20.0	0.07—0.10	6.6—8.4	<1	Low.
100	75—90	5—10	....	(3)	20.0+	0.05—0.07	7.9—8.4	<1	Low.
95—100	50—75	15—25	....	(3)	6.3—20.0	0.07—0.11	6.6—8.4	<1	Low.
95—100	60—70	25—35	....	(3)	6.3—20.0	0.11—0.13	7.9—8.4	<1	Low.
75—90	50—70	35—50	....	....	2.0—6.3	0.11—0.13	6.1—7.3	>1	Low.
75—90	55—70	45—60	25—40	10—20	0.2—0.63	0.16—0.18	6.6—7.3	>1	Moderate.
....	....	....	....	....	<0.06	....	7.4—7.8	....	
85—100	50—70	15—20	....	(3)	6.3—20.0	0.06—0.08	5.6—7.3	>1	Low.
55—65	50—60	5—15	....	(3)	6.3—20.0	0.04—0.06	5.6—6.1	>1	Low.
85—100	50—70	15—20	....	(3)	6.3—20.0	0.06—0.08	5.6—7.3	>1	Low.

TABLE 5.—*Estimated*

Soil series and map symbols	Depth to— Bedrock or hardpan	Depth to— Seasonal high water table	Depth from surface (typical profile)	Classification USDA texture	Classification Unified	Classification AASHO	Percentage Larger than 3 inches	Percentage No. 4 (4.7 mm.)
	Feet	*Feet*	*Inches*					
Mottsville—continued MsC, MsD	> 5	(1)	0–20	Sandy loam	SM	A–2, A–4	100	95–100
			20–60	Loamy coarse sand.	SM	A–1, A–2	100	100
Murrieta: MuE	1–2	(1)	0–9	Stony clay loam.	CL	A–6, A–7	75–95	75–95
			9–17	Clay	CH, MH	A–7	100	100
			17	Olivine basalt.				
Oak Glen: OgD, OgE	> 5	(1)	0–48	Gravelly sandy loam.	GM, SM	A–1	85–100	65–80
			48–60	Gravelly loamy sand.	GM, SM	A–1	85–100	65–80
OkD	> 5	(1)	0–60	Fine sandy loam.	SM	A–4	100	90–100
Pachappa: PaA, PaC2.	> 5	(1)	0–20	Fine sandy loam.	SM	A–4	100	100
			20–63	Loam	ML	A–4	100	100
Perkins: PeC, PgB, PgC, PgD2.	> 5	(1)	0–12	Loam and gravelly loam.	ML	A–4	100	85–100
			12–44	Gravelly clay loam.	CL	A–6	100	95–100
			44–60	Very gravelly sandy clay loam.	GC	A–2	60–90	40–50
Placentia: PlB, PlD, PmE.	> 5	(1)	0–18	Fine sandy loam and loam that is cobbly in places.	SM, ML	A–4	100	100
			18–39	Heavy clay loam.	CL,CH,MH	A–6, A–7	100	100
			39–57	Sandy clay loam.	CL	A–6	100	100
			57	Stratified alluvium.				
Porterville: PoC, PrD	> 5	(1)	0–66	Clay that is cobbly in places.	CH, MH	A–7	90–95	85–90
PsC, PtB, PvD2	3–4	(1)	0–36	Clay	CH, MH	A–7	90–95	85–90
			36	Calcareous marl or sandstone.				
Ramona: RaA, RaB2, RaB3, RaC2, RaC3, RaD2, RaD3, RaE3, ReC2, RmE3, RnD2, RnE3. (For properties of Buren soils in mapping units RmE3 RnD2, and RnE3, refer to Buren series in this table.	> 5	(1)	0–23	Sandy loam	SM	A–4	100	95–100
			23–68	Sandy clay loam.	SC,ML,CL	A–4, A–6	100	95–100
			68–74	Fine sandy loam.	SC	A–6	100	95–100

properties—Continued

passing sieve—			Atterberg values		Permeability	Available water capacity	Reaction	Salinity[1]	Shrink-swell potential
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Liquid limit	Plastic index					
					Inches per hour	*Inches per inch of soil*	*pH value*	*Mmhos/cm at 25° C.*	
70—85	50—65	30—45	....	[3]	2.0—6.3	0.11—0.13	5.6—6.1	>1	Low.
80—95	35—65	5—15	....	[3]	6.3—20.0	0.05—0.07	5.6—7.3	>1	Low.
65—75	55—65	50—70	30—50	15—30	0.2—0.63	0.17—0.19	5.6—6.5	>1	Moderate.
95—100	80—95	75—95	50—75	20—40	0.06—0.2	0.14—0.16	5.6—6.0	>1	High.
50—70	35—45	15—35	....	[3]	2.0—6.3	0.07—0.09	5.6—6.5	>1	Low.
50—70	25—40	5—15	....	[3]	2.0—6.3	0.05—0.07	5.6—6.5	>1	Low.
85—95	55—70	40—50	....	[3]	2.0—6.3	0.13—0.15	5.6—6.5	>1	Low.
100	70—90	35—50	....	[3]	2.0—6.3	0.13—0.15	6.1—7.3	>1	Low.
100	75—95	60—70	15—35	5—10	0.63—2.0	0.16—0.18	7.4—8.4	>1	Moderate.
75—95	60—85	50—65	15—35	5—10	0.63—2.0	0.15—0.17	6.1—7.3	>1	Moderate.
75—85	75—85	60—70	25—40	10—30	0.06—0.2	0.13—0.15	6.1—7.3	>1	Moderate.
20—35	20—30	15—20	20—30	10—15	0.63—2.0	0.10—0.12	6.1—7.3	>1	Low.
95—100	70—85	40—60	....	[3]	0.63—2.0	0.13—0.15	5.6—6.5	>1	Low.
95—100	90—100	70—80	35—75	20—45	<0.06	0.04—0.06	6.6—8.4	1—4	High.
95—100	90—100	60—70	20—35	10—15	0.2—0.63	0.14—0.16	7.9—8.4	1—4	Moderate.
80—90	80—90	70—90	50—75	20—45	0.06—0.20	0.14—0.16	6.6—8.4	>1	High.
80—90	80—90	70—90	50—75	20—45	0.06—0.20	0.14—0.16	7.4—8.4	1—8 +	High.
90—100	75—85	35—45	....	[3]	2.0—6.3	0.11—0.13	6.1—7.3	>1	Low.
90—100	75—90	45—55	25—35	5—15	0.2—0.63	0.18—0.20	6.1—8.4	>1	Low.
90—100	65—75	35—45	20—30	5—15	2.0—6.3	0.13—0.15	6.1—8.4	>1	Low.

TABLE 5.—*Estimated*

Soil series and map symbols	Depth to— Bedrock or hardpan	Depth to— Seasonal high water table	Depth from surface (typical profile)	Classification: USDA texture	Classification: Unified	Classification: AASHO	Percentage: Larger than 3 inches	Percentage: No. 4 (4.7 mm.)
	Feet	*Feet*	*Inches*					
Ramona—continued								
RdD2, RdE3, RfC2	1½—3½	(1)	0—12	Sandy loam	SM	A—4	100	95—100
			12—36	Clay loam	SC, ML, CL	A—4, A—6	100	95—100
			36	Calcareous consolidated sediment.				
San Emigdio:								
SdD, SeA, SeC2, SeD2.	>5	(1)	0—60	Fine sandy loam.	SM	A—4	100	95—100
SfA	>5	(1)	0—40	Fine sandy loam.	SM	A—4	100	95—100
			40—60	Loamy sand	SM	A—2	100	100
SgA, SgC, SgD2	>5	(1)	0—60	Loam	ML, CL	A—4, A—6	100	100
San Timoteo: SmE2, SmF2.	1½—2½	(1)	0—22	Loam	ML, CL	A—4	100	95—100
			22	Decomposing sandstone.				
Sheephead: SnD2, SpG2.	1—1½	(1)	0—17	Fine sandy loam.	SM, ML	A—4	95—100	85—95
			17	Strongly weathered mica-schist.				
Soboba: SrE, SsD	>5	(1)	0—11	Stony and cobbly loamy sand.	GP, GW	A—1	80—100	50—80
			11—60	Very gravelly and cobbly sand and loamy sand.	GP, GW	A—1	50—75	30—40
Soper: StF2, SuF2	2—3	(1)	0—14	Loam that is cobbly in places.	ML, CL	A—4	90—100	80—100
			14—26	Gravelly clay loam.	CL, CH, SC	A—7	90—100	70—95
			26	Conglomerate.				
Temescal: TaF2, TbF2.	1—1½	(1)	0—17	Loam	ML, CL	A—4	100	100
			17	Fractured latiteporphyry.				
Tollhouse: TfF2, ThD2, ThE2.	1—1½	(1)	0—9	Coarse sandy loam.	SM	A—2	100	95—100
			9—18	Coarse sand	SP, SW	A—1	100	100
			18	Granodiorite.				
Traver:								
Tp2, Tr2	>5	>5	0—13	Loamy fine sand.	SM	A—2	100	100
			13—60	Fine sandy loam and loam.	SM, ML	A—4, A—6	100	100
Ts, Tt2	>5	>5	0—20	Fine sandy loam.	SM	A—4	100	100
			20—60	Loam and clay loam.	ML, CL	A—6, A—7	100	100
Tujunga:								
TuB, TvC	>5	(1)	0—10	Loamy sand	SM	A—2	100	100
			10—60	Sand	SW, SP	A—1	100	100
TwC	5	(1)	0—60	Gravelly loamy sand.	GM	A—1	80—90	70—80

properties—Continued

passing sieve—			Atterberg values		Permeability	Available water capacity	Reaction	Salinity[1]	Shrink-swell potential
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Liquid limit	Plastic index					
					Inches per hour	*Inches per inch of soil*	*pH value*	*Mmhos/cm at 25° C.*	
90–100	75–85	35–45		[3]	2.0–6.3	0.11–0.13	6.1–7.3	>1	Low.
90–100	75–90	45–55	20–35	5–15	0.2–0.63	0.19–0.21	6.1–8.4	>1	Low.
90–100	75–90	40–50		[3]	2.0–6.3	0.13–0.15	7.4–8.4	>1	Low.
90–100	75–90	40–50		[3]	2.0–6.3	0.13–0.15	7.4–8.4	>1	Low.
85–100	50–60	15–20		[3]	2.0–6.3	0.06–0.08	7.4–8.4	>1	Low.
95–100	70–85	55–70	15–35	5–15	0.63–2.0	0.16–0.18	7.4–8.4	<1	Low.
90–95	70–85	55–75	15–35	5–10	0.63–2.0	0.16–0.18	6.6–8.4	<1	Low.
80–90	55–70	35–55		[3]	2.0–6.3	0.13–0.15	6.1–7.3	<1	Low.
40–60	25–35	0–5		[3]	6.3–20.0	0.05–0.07	6.1–7.8	<1	Low.
20–35	10–25	0–5		[3]	6.3–20.0	0.03–0.05	6.1–7.8	<1	Low.
80–100	65–85	50–65	10–35	5–10	0.63–2.0	0.14–0.18	6.1–6.5	<1	Moderate.
60–90	45–60	40–55	40–65	30–45	0.2–0.63	0.12–0.14	6.1–6.5	<1	Moderate.
95–100	80–90	50–65	10–35	5–10	0.63–2.0	0.16–0.18	6.1–7.3	<1	Moderate.
85–95	60–80	20–30		[3]	2.0–6.3	0.10–0.12	5.6–6.0	<1	Low.
70–90	30–50	0–5		[3]	6.3–20.0	0.05–0.07	5.6–6.0	<1	Low.
100	50–75	25–35		[3]	2.0–6.3	0.09–0.11	7.9–8.4	4–15	Low.
100	60–80	45–60	5–30	5–15	0.63–2.0	0.13–0.18	7.9–9.0+	4–15+	Low.
100	60–80	40–50	0–15	0–10	2.0–6.3	0.11–0.13	7.9–8.4	4–15+	Low.
100	85–95	60–75	35–45	10–20	0.2–0.63	0.16–0.20	7.9–9.0+	4–15+	Moderate.
85–100	50–60	15–20		[3]	6.3–20.0	0.06–0.08	6.6–7.8	<1	Low.
85–100	40–50	0–5			6.3–20.0	0.05–0.07	6.1–7.8	<1	Low.
50–75	30–50	5–10		[3]	6.3–20.0	0.05–0.07	6.1–7.8	<1	Low.

TABLE 5.—*Estimated*

Soil series and map symbols	Depth to— Bedrock or hardpan	Depth to— Seasonal high water table	Depth from surface (typical profile)	USDA texture	Unified	AASHO	Percentage Larger than 3 inches	Percentage No. 4 (4.7 mm.)
Vallecitos: VaE3, VdF2.	1–1½	(1)	0–12	Loam	ML, CL	A–4	100	95–100
			12–20	Heavy clay loam.	CL	A–6, A–7	100	95–100
			20	Sandstone.				
Vallecitos, thick solum variant: VeC2, VeD2, VeF2.	1½–4	(1)	0–8	Loam	ML, CL	A–4	100	95–100
			8–27	Clay loam and sandy clay.	SC, CL	A–6, A–7	100	95–100
			27–48	Loam	ML, CL	A–4	100	95–100
			48	Sandstone.				
Visalia: VlC2, VmA, VmC.	>5	(1)	0–60	Sandy loam and fine sandy loam.	SM	A–2	100	100
Vista: VsC, VsD2, VsF2, VtF2.	1½–3	(1)	0–24	Coarse sandy loam that is gravelly in places.	SM	A–2	100	95–100
			24	Weathered granodiorite.				
Waukena:								
Wa, Wb, Wc	>5	>5	0–11	Loamy fine sand to fine sandy loam.	SM	A–2	100	100
			11–60	Clay loam	ML, CL	A–6, A–7	100	100
Wd	>5	>5	0–12	Loam to clay loam.	ML, CL	A–6, A–7	100	100
			12–36	Sandy clay	SC, CL	A–6	100	100
			36–60	Clay loam	ML, CL	A–6, A–7	100	100
Willows:								
Wf, Wg, Wh	>5	3–5	0–60	Silty clay	CH, MH	A–7	100	100
Wm, Wn	>5	3–5	0–42	Silty clay	CH, MH	A–7	100	100
			42	Cemented lenses.				
Wyman:								
WxD2	>5	(1)	0–12	Fine sandy loam.	SM	A–2	100	100
			12–36	Loam	ML, CL	A–6	100	100
			36–60	Coarse sandy loam.	SM	A–2	100	100
WyC2	>5	(1)	0–14	Loam	CL	A–6	100	100
			14–36	Clay loam	ML, CL	A–6	100	100
			36–50	Loam	CL	A–6	100	100
			50–60	Coarse sandy loam.	SM	A–2	100	100
Yokohl: YbC, YbD2, YbE3, YkE2.	1–3½	(1)	0–10	Loam that is cobbly in places.	ML, CL	A–4	100	100
			10–26	Clay	CH	A–7	100	100
			26	Indurated hardpan.				
Ysidora:								
YrD2	1–3	(1)	0–12	Very fine sandy loam.	ML	A–4	100	100
			12–29	Clay loam	CL	A–6	100	95–100
			29	Indurated hardpan.				
YsC2, YsE2, YsE3	1–3	(1)	0–12	Gravelly very fine sandy loam.	ML	A–4	90–100	85–95
			12–29	Gravelly clay loam.	ML, CL	A–6	90–100	85–95
			29	Indurated				

properties—Continued

passing sieve—			Atterberg values						
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Liquid limit	Plastic index	Permeability	Available water capacity	Reaction	Salinity[1]	Shrink-swell potential
90—95	70—85	50—65	15—35	5—10	0.63—2.0	0.16—0.18	5.1—6.5	<1	Moderate.
90—95	85—95	70—80	35—45	10—20	0.2—0.63	0.19—0.21	5.1—6.5	<1	High.
90—95	70—85	50—65	15—35	5—10	0.63—2.0	0.16—0.18	6.1—7.3	<1	Moderate.
90—95	85—95	45—55	35—45	15—25	0.2—0.63	0.19—0.21	6.1—8.4	<1	High.
90—95	70—85	50—65	15—35	5—10	0.63—2.0	0.16—0.18	7.9—8.4	<1	Moderate.
95—100	50—70	25—35		(3)	2.0—6.3	0.11—0.15	5.6—7.8	<1	Low.
90—100	65—75	25—35		(3)	2.0—6.3	0.10—0.12	5.6—6.5	<1	Low.
100	60—75	10—20		(3)	2.0—6.3	0.09—0.11	7.9—9.0	4—15	Low.
100	85—95	70—80	30—50	10—30	0.06—0.02	0.19—0.21	7.9—9.0+	4—15	Moderate.
100	75—85	60—75	30—50	10—30	0.2—0.63	0.18—0.21	7.9—9.0	4—15	Moderate.
100	85—95	45—60	25—40	10—20	0.06—0.2	0.15—0.17	7.9—9.0	4—15+	High.
100	85—95	70—80	30—50	10—30	0.2—0.63	0.19—0.21	7.9—9.0+	4—15+	Moderate.
95—100	95—100	90—100	50—70	25—40	0.06—0.2	0.15—0.17	7.9—9.0+	4—15+	High.
95—100	95—100	90—100	50—70	25—40	0.06—0.2	0.15—0.17	7.9—9.0+	4—15+	High.
95—100	70—85	15—25		(3)	2.3—6.0	0.13—0.15	6.1—7.3	<1	Low.
95—100	80—95	50—60	25—40	10—20	0.2—0.63	0.16—0.18	6.6—7.8	<1	Moderate.
90—95	60—75	10—20		(3)	2.3—6.0	0.10—0.12	7.4—8.4	<1	Low.
95—100	80—90	50—60	20—35	10—20	0.63—2.0	0.16—0.18	6.1—7.3	<1	Moderate.
95—100	80—95	60—75	30—40	10—20	0.2—0.63	0.19—0.21	6.6—7.8	<1	Moderate.
95—100	80—90	50—60	20—35	10—20	0.63—2.0	0.16—0.18	7.4—8.4	<1	Moderate.
90—95	60—75	10—20		(3)	2.3—6.0	0.10—0.12	7.4—8.4	<1	Low.
90—100	70—85	60—75	15—35	5—10	0.63—2.0	0.16—0.18	5.6—7.3	<1	Moderate.
85—100	80—95	70—90	50—60	25—35	0.06—0.2	0.14 0.16	6.6—8.4	<4	High.
					<0.06		7.9—8.4		
95—100	60—80	50—65	5—15	0—10	0.63—2.0	0.15—0.17	5.6—6.5	<1	Low.
90—95	70—90	65—75	30—40	10—20	0.2—0.63	0.19—0.21	5.6—6.5	<1	Moderate.
					<0.06		6.6—7.8		
75—90	60—75	50—60	5—15	0—10	2.0—6.3	0.13—0.15	5.6—6.5	<1	Low.
75—90	65—80	55—65	30—40	10—20	0.2—0.63	0.17—0.19	5.6—6.5	<1	Moderate.
					<0.06		6.6—7.8		

TABLE 6.—*Engineering*

[Not included in this table, because their characteristics are too variable for engineering use, are the land types Badland (BaG), land

Soil series and map symbols	Suitability as source of—			Hydrologic soil group	Soil
	Topsoil	Sand and gravel	Road fill		Road location
Altamont: AaD, AaE2, AaF, AbF.	Poor: Clay	Unsuitable: More than 50 percent fines.	Poor: A—7	D	High shrink-swell potential; soft sandstone at a depth of 20 to 36 inches; steep slopes.
Anza: AcC, AdA, AdC	Good	Unsuitable: More than 50 percent fines.	Fair: A—4	B	Most features favorable.
Arbuckle:					
AkC, AkD	Good to fair: Loam and clay loam to a depth of 45 inches.	Unsuitable to a depth of 45 inches, more than 50 percent fines; good for gravel below a depth of 45 inches.	Fair to poor: A—4, A—6.	B	Moderate shrink-swell potential; slopes to 15 percent.
AlC, AlD, AlE, AlE3, AmC	Fair: More than 15 percent gravel.	Unsuitable for sand, gravelly loam, and gravelly clay loam; fair to poor for gravel, 25 to 75 percent gravel.	Good	B	Low to moderate shrink-swell potential; strong slopes in places.
Arlington: AnC, AnD, AoA, AoC, AoD, ApB, ArB, ArD, AtC2, AtD2, AtF3. (For interpretations of Greenfield soils in mapping units AtC2, AtD2, and AtF3, refer to Greenfield series in this table.)	Good to fair: Hardpan at a depth of 21 to 54 inches.	Unsuitable: More than 50 percent fines.	Fair to poor: A—4, A—6.	B—C	Moderate shrink-swell potential; hardpan at a depth of 21 to 54 inches; steep slopes in places.
Auld: AuC, AuD, AyF	Poor: Clay	Unsuitable: More than 50 percent fines.	Fair to poor: A—4 to A—7.	D	High shrink-swell potential; rock at a depth of 30 to 60 inches; steep slopes in places.
Bishop: Bb	Poor: Slight to strong salinity.	Unsuitable: More than 50 percent fines.	Fair to poor: A—4, A—6.	B—C	Moderate shrink-swell potential; water table at a depth of 1½ to 5 feet.
Bonsall: BdC, BdD	Poor: Shallow to moderately deep to clay.	Unsuitable: More than 50 percent fines.	Good in upper 13 inches, poor below: A—7.	D	High shrink-swell potential; tonalite at a depth of 27 to 54 inches; slopes to 15 percent.
Bosanko: BfC, BfD	Poor: Clay	Unsuitable: More than 50 percent fines.	Good to poor: A—7.	D	High shrink-swell potential; rock at a depth of 23 to 36 inches; slopes to 15 percent.
Buchenau: BhA, BhC, BkC2	Good to fair: Units BhA and BhC slightly saline and moderately deep to deep to hardpan.	Unsuitable: More than 50 percent fines.	Fair: A—4, A—6.	C	Most features favorable.

interpretations

Gullied land (GzG), River wash (RsC), Rock land (RtF), Rough broken land (RuF), Terrace escarpments (TeG), and Wet alluvial (WeD)]

features affecting—					Soil limitations for use as a septic tank filter field
Water retention		Agricultural drainage	Irrigation		
Embankments	Reservoir area				
Fair to poor stability; very high to high compressibility; good to fair resistance to piping.	Slow permeability; soft sandstone at a depth of 20 to 36 inches; steep slopes.	Drainage not needed	High available water capacity; steep slopes; slow intake rate.		Severe: Slopes; slow permeability.
Poor to good stability; slight to medium compressibility; poor to good resistance to piping.	Moderately rapid permeability.	Moderately rapid permeability; water table at a depth of more than 5 feet.	Most features favorable..		Slight on 0 to 5 percent slopes; moderate on 5 to 8 percent slopes.
Poor to good stability; medium to high compressibility; poor to good resistance to piping.	Moderately slow permeability; slopes to 15 percent.	Drainage not needed	High available water capacity; medium intake rate; slopes to 15 percent.		Severe: Moderately slow permeability.
Fair stability; slight compressibility; poor resistance to piping.	Moderately slow permeability; strong slopes in places.	Drainage not needed	Moderate available water capacity; moderate intake rate; strong slopes in places.		Severe: Moderately slow permeability.
Poor to good stability; medium to high compressibility; good to poor resistance to piping.	Slow permeability; hardpan at a depth of 21 to 54 inches; steep slopes in places.	Slow permeability; hardpan at a depth of 21 to 54 inches.	Low to moderate available water capacity; moderate intake rate; steep slopes in places.		Severe: Slow permeability.
Fair to poor stability; high compressibility; good to fair resistance to piping.	Slow permeability; rock at a depth of 30 to 60 inches; steep slopes in places.	Drainage not needed	Moderate to low available water capacity; slow intake rate; steep slopes in places.		Severe: Slow permeability.
Poor stability; medium compressibility; poor resistance to piping.	Moderate to moderately slow permeability; water table at a depth of 1½ to 5 feet.	Moderate to moderately slow permeability; water table at a depth of 1½ to 5 feet.	High available water capacity; slow intake rate; slight to strong salinity.		Severe: Moderately slow to moderate permeability; water table.
Poor to good stability; medium to high compressibility; good resistance to piping.	Very slow permeability; rock at a depth of 27 to 54 inches; slopes to 15 percent.	Very slow permeability...	Low available water capacity; moderate intake rate; very slowly permeable clay; slopes to 15 percent.		Severe: Very slow permeability.
Poor to good stability; medium to very high compressibility; good to fair resistance to piping.	Slow permeability; rock at a depth of 23 to 36 inches; slopes to 15 percent.	Drainage not needed	Moderate available water capacity; slow intake rate.		Severe: Slow permeability.
Poor to good stability; medium to high compressibility; good to poor resistance to piping.	Moderately slow permeability over very slow permeability; hardpan at a depth of 24 to 54 inches.	Moderately slow permeability over very slow permeability; hardpan at a depth of 24 to 54 inches.	Low to moderate available water capacity; slow intake rate.		Severe: Moderately slow permeability over very slow permeability.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Hydrologic soil group	Soil
	Topsoil	Sand and gravel	Road fill		Road location
Bull Trail: BsC2, BsD2, BsE3, BtD2, BtE3.	Good: In all units except BtD2 and BtE3, which have a stony surface layer.	Unsuitable: Mostly more than 50 percent fines.	Good	B	Moderate shrink-swell potential; moderately steep slopes in places.
Buren: BuC2, BuD2, BvD3, BxC2.	Fair: Moderately deep tp deep; clay loam below a depth of 12 inches.	Unsuitable: More than 50 percent fines.	Poor: A—6	C	Moderate shrink-swell potential; slopes to 15 percent.
Cajalco: CaC2, CaD2, CaF2, CbD2, CbF2.	Good to fair in units CaC2, CaD2, and CaF2, moderately deep to deep to rock; poor in units CbD2 and CbF2, rock out crops.	Poor to unsuitable for sand, 25 to 50 percent fines; unsuitable for gravel, less than 25 percent gravel.	Good to poor: A—2, A—6.	C	Moderate shrink-swell potential; steep slopes; gabbro at a depth of 18 to 46 inches.
Calpine: CcC2, CcD2, CdC2	Good	Fair to poor for sand, 10 to 45 percent fines; unsuitable for gravel, less than 25 percent gravel.	Good	B	Most features favorable.
Chino: Ce, Cf, Cg	Fair to poor: Slightly to strongly saline-alkali.	Unsuitable: More than 50 percent fines.	Poor: A—6	B—C	Moderate shrink-swell potential; water table at a depth of 1½ to 5 feet.
Cieneba: ChC, ChD2, ChF2, CkD2, CkF2.	Poor: Shallow to rock.	Good to poor for sand, 15 to 35 percent fines; poor to unsuitable for gravel, 0 to 40 percent gravel.	Good	C	Rock at a depth of 10 to 22 inches; steep slopes in places.
Cortina: ClC, CmC, CnC, CoA, CpA, CrD.	Poor: Many pebbles and cobblestones.	Good for sand and gravel.	Good	A	Slopes to 15 percent; units CmC and ClC subject to flooding.
Crafton: CsF2, CtF2, CuE	Poor: Stony and moderately deep.	Good to poor: 20 to 30 percent fines; 10 to 40 percent gravel.	Good	C	Rock at a depth of 20 to 36 inches; steep slopes in places.
Crouch: CvD2, CwD2, CwE2, CyE2, CyF2.	Fair to poor: Moderately deep to deep.	Poor for sand, 20 to 30 percent fines; unsuitable for gravel, less than 25 percent gravel.	Good	C	Rock at a depth of 22 to 46 inches; steep slopes in places.

interpretations—Continued

features affecting—					
Water retention		Agricultural drainage	Irrigation	Soil limitations for use as a septic tank filter field
Embankments	Reservoir area			
Fair stability; slight compressibility; poor to good resistance to piping.	Moderately slow permeability over very slow permeability; weakly cemented hardpan at a depth of 20 to 60 inches; moderately steep slopes in places.	Moderately slow permeability over very slow permeability; weakly cemented hardpan at a depth of 20 to 60 inches.	Very low to moderate available water capacity; rapid intake rate; moderately steep slopes in places.	Severe: Moderately slow permeability over very slow permeability.
Fair to good stability; medium to high compressibility; good resistance to piping.	Moderately slow permeability over very slow permeability; weakly cemented loam at a depth of 27 to 50 inches; slopes to 15 percent.	Moderately slow permeability over very slow permeability; weakly cemented loam at a depth of 27 to 50 inches.	Low to moderate available water capacity; rapid intake rate; slopes to 15 percent.	Severe: Moderately slow permeability over very slow permeability.
Fair to poor stability; slight to medium compressibility; poor resistance to piping.	Moderate permeability; rock at a depth of 18 to 46 inches; steep slopes in places.	Drainage not needed	Low to moderate available water capacity; rapid intake rate; steep slopes in places.	Moderate on 2 to 8 percent slopes; severe on slopes of more than 8 percent; bedrock.
Fair stability; slight compressibility; poor resistance to piping.	Rapid permeability	Drainage not needed	Moderate available water capacity.	Moderate on 2 to 8 percent slopes; severe on 8 to 15 percent slopes.
Poor to good stability; medium to high compressibility; poor to good resistance to piping.	Moderately slow permeability; water table at a depth of 1½ to 5 feet.	Moderately slow permeability; water table at a depth of 1½ to 5 feet.	High available water capacity; slow intake rate; slight to strong salinity and alkalinity.	Severe: Moderately slow permeability; water table in places.
Fair stability; very slight to slight compressibility; poor resistance to piping.	Rapid permeability; rock at a depth of 10 to 22 inches; steep slopes in places.	Drainage not needed	Very low available water capacity; rapid intake rate; steep slopes in places.	Severe: Slopes; depth to bedrock.
Fair to good stability; very slight compressibility; good resistance to piping.	Rapid permeability; slopes to 15 percent.	Drainage not needed	Moderately low available water capacity; very rapid intake rate; slopes to 15 percent.	Slight in units CoA and CpA; moderate in units CnC and CrD, slopes; severe in ClC and CmC, flooding.
Fair stability; slight compressibility; poor resistance to piping.	Moderately rapid permeability; rock at a depth of 20 to 36 inches; steep slopes in places.	Drainage not needed	Low available water capacity; rapid intake rate; steep slopes in places.	Severe: Slopes; depth to bedrock.
Fair stability; slight compressibility; poor resistance to piping.	Moderately rapid permeability; rock at a depth of 22 to 46 inches; steep slopes in places.	Drainage not needed	Low available water capacity; rapid intake rate; steep slopes in places.	Severe: Slopes; depth to bedrock.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Hydrologic soil group	Soil
	Topsoil	Sand and gravel	Road fill		Road location
Delhi: DaD2, DbA	Poor: Sand and loamy sand.	Fair to poor for sand, 15 to 35 percent fines; unsuitable for gravel, less than 25 percent gravel.	Good	A	Slopes to 15 percent
Dello: DgB, DmA, DnB, DoA, DpB, DrA.	Poor: Loamy sand; saline in places.	Fair to poor for sand, 15 to 30 percent fines; unsuitable for gravel, less than 15 percent gravel; poor for gravel in all except units DnB and DrA, which are 20 to 30 percent gravel.	Good	A—C	Subject to blowing by wind; water table at a depth of 1 to 4 feet.
Domino: Ds2, Dt, Du, Dv, Dw	Fair to poor for units Ds2 and Du, moderately deep to deep to hardpan; poor for units Dt, Dv, and Dw, saline-alkali.	Unsuitable: More than 50 percent fines.	Fair: A—4	C	Moderate shrink-swell potential; hardpan at a depth of 20 to 42 inches; water table at a depth of 2½ to 5 feet in places.
Escondido: EcC2, EcD2, EcE2, EfF2.	Fair: Moderately deep to deep.	Unsuitable: More than 50 percent fines.	Fair: A—4	C	Rock at a depth of 24 to 50 inches; steep slopes in places.
Exeter: EnA, EnC2, EoB, EpA, EpC2, EwB, EyB.	Fair: Moderately deep to deep.	Unsuitable: Mostly more than 50 percent fines.	Fair: A—4	C	Moderate shrink-swell potential; hardpan at a depth of 20 to 54 inches.
Fallbrook: FaD2, FaE2, FbC2, FbF2, FcD2, FcF2, FfC2, FkD2.	Poor: Shallow to moderately deep; sandy clay loam subsoil.	Fair to poor for sand, 15 to 50 percent fines; unsuitable for gravel, less than 25 percent gravel.	Good	B—C	Moderate shrink-swell potential; rock at a depth of 10 to 36 inches; steep slopes in places.
Friant: FwE2, FyE2, FyF2	Poor: Shallow to rock.	Poor for sand, 35 to 50 percent fines; unsuitable for gravel, less than 25 percent gravel.	Fair: A—4	D	Rock at a depth of 10 to 20 inches; steep slopes in places.
Garretson: GaA, GaC, GaD2, GdA, GdC, GdD2.	Good for units GaA, GaC, and GaD2; fair for units GdA, GdC, GdD2; gravelly.	Unsuitable for sand, mostly more than 50 percent fines; unsuitable for gravel in units GaA, GaC, and GaD2, less than 15 percent gravel; poor for gravel in units GdA, GdC, and GdD2, 20 to 35 percent gravel.	Fair: A—4	B	Most features favorable.

interpretations—Continued

features affecting—					
Water retention		Agricultural drainage	Irrigation	Soil limitations for use as a septic tank filter field
Embankments	Reservoir area			
Fair stability; slight compressibility; poor resistance to piping.	Rapid permeability; slopes to 15 percent.	Drainage not needed	Moderate available water capacity; very rapid intake rate; slopes to 15 percent.	Slight to moderate on 0 to 5 percent slopes; severe on 5 to 15 percent slopes.
Fair stability; slight compressibility; poor resistance to piping.	Moderately rapid to rapid permeability; water table at a depth of 1 to 4 feet.	Moderately rapid to rapid permeability; water table at a depth of 1 to 4 feet.	Low to moderate available water capacity; very rapid intake rate; slight to strong salinity.	Severe: Flooding; water table.
Poor to good stability; medium to high compressibility; poor to good resistance to piping.	Moderate permeability over very slow permeability; hardpan at a depth of 20 to 42 inches; water table at a depth of 2½ to 5 feet in places.	Moderate permeability over very slow permeability; hardpan at a depth of 20 to 42 inches; water table at a depth of 2½ to 5 feet in places.	Moderate available water capacity; medium intake rate; units Dt, Dv, and Dw are moderately to strongly saline-alkali.	Severe: Depth to hardpan; permeability; water table.
Poor to good stability; medium to high compressibility; poor to good resistance to piping.	Moderate permeability; rock at a depth of 24 to 50 inches; steep slopes in places.	Drainage not needed	Low available water capacity; rapid intake rate; steep slopes in places.	Severe: Depth to rock; slope.
Poor to good stability; medium to high compressibility; poor to good resistance to piping.	Moderate permeability over very slow permeability; hardpan at a depth of 20 to 54 inches.	Moderate permeability over very slow permeability; hardpan at a depth of 20 to 54 inches.	Low to moderate available water capacity; medium intake rate; unit EoB slightly saline-alkali.	Severe: Depth to hardpan.
Fair stability; slight compressibility; poor to good resistance to piping.	Moderate permeability; rock at a depth of 10 to 36 inches; steep slopes in places.	Drainage not needed	Low to moderate available water capacity; medium intake rate; steep slopes in places.	Severe: Depth to bedrock; slope.
Fair stability; slight compressibility; poor resistance to piping.	Moderately rapid permeability; rock at a depth of 10 to 20 inches; steep slopes in places.	Drainage not needed	Low to very low available water capacity; rapid intake rate; steep slopes in places.	Severe: Depth to bedrock; slope.
Poor to good stability; medium to high compressibility; poor to good resistance to piping.	Moderate permeability; slopes to 15 percent.	Drainage not needed	Moderate to high available water capacity; medium intake rate; slopes to 15 percent.	Slight to moderate on 0 to 8 percent slopes, permeability and slope; severe on 8 to 15 percent slopes, slope.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of— Topsoil	Sand and gravel	Road fill	Hydrologic soil group	Soil— Road location
Gaviota: GaG3, GfF2, GgF2	Poor: Shallow ...	Poor for sand, 40 to 60 percent fines; unsuitable for gravel, less than 25 percent gravel.	Fair: A—4	D	Rock at a depth of 6 to 20 inches; steep to very steep slopes.
Gorgonio: GhC, GhD, GkD, GlC, GmD, GnD.	Poor: Loamy sand; gravelly and cobbly.	Good to fair for sand, 5 to 20 percent fines; fair to poor for gravel, 30 to 55 percent gravel.	Good	A	Most features favorable.
Grangeville: GoB, GpB, GrB, GsB, GtA, GtD, GuB, GvB, GwA, GxA.	Poor: Slightly to strongly saline-alkali; water table in places.	Good to fair for sand in units GrB and GsB, 0 to 15 percent fines; poor for sand in the remaining units; unsuitable for gravel in all units, less than 25 percent gravel.	Good to fair: A—2, A—4.	B—C	Most features favorable; in places water table is at a depth of 20 to 60 inches in units GuB and GvB.
Greenfield: GyA, GyC2, GyD2, GyE2.	Good	Poor to unsuitable for sand, 25 to 60 percent fines; unsuitable for gravel, less than 25 percent gravel.	Good to fair: A—2, A—4.	B	Most features favorable.
Hanford: HaC, HcA, HcC, HcD2, HdD2, HeC2, HfD, HgA.	Good in all except unit HdD2, which is poor; cobbly.	Good to fair for sand, 0 to 25 percent fines; poor for gravel, 25 to 55 percent gravel.	Good	B	Most features favorable; unit HdD2 is cobbly.
Hilmar: HhA2, HlA, HlC	Fair to poor: Loamy sand and loamy very fine sand.	Poor to unsuitable for sand in unit HhA2, 25 to 85 percent fines; poor for sand in units HlA and HlC, 35 to 45 percent fines; unsuitable for gravel, less than 25 percent gravel.	Poor below a depth of 22 inches in unit HhA2, A—6; good to fair in other units, A—2, A—6.	A—C (HlA, HlC)	Most features favorable.
Honcut: HnC, HnD2, HoE, HuC2.	Good in all units, except HoE, which is cobbly in surface layer.	Fair to poor for sand, 25 to 35 percent fines in all units, except HuC2 that is 50 to 70 percent fines and is unsuitable for sand; unsuitable for gravel, less than 25 percent gravel in all units except HoE that is 10 to 40 percent gravel and is poor to unsuitable for gravel.	Good	B	Moderately steep slopes in places; surface layer of unit HoE is cobbly.

interpretations—Continued

features affecting—				Soil limitations for use as a septic tank filter field
Water retention		Agricultural drainage	Irrigation	
Embankments	Reservoir area			
Fair stability; slight compressibility; poor resistance to piping.	Moderate permeability; rock at a depth of 6 to 20 inches; steep to very steep slopes.	Drainage not needed	Low to very low available water capacity; rapid intake rate; steep to very steep slopes.	Severe: Slope; depth.
Fair to good stability; very slight to slight compressibility; good to poor resistance to piping.	Rapid permeability	Drainage not needed	Low to moderate available water capacity; very rapid intake rate; slopes to 15 percent.	Slight to moderate for units GhC, and GIC, slope; GhD, moderate to severe for units GkD, GmD, GnD, slope; flooding.
Poor to good stability; slight to high compressibility; poor to good resistance to piping.	Rapid to moderate permeability in all units except GrB and GsB, which have very rapid permeability at a depth below 36 inches; water table at a depth of 20 to 60 inches in places.	Rapid to moderate permeability in all units except GrB and GsB, which have very rapid permeability at a depth below 36 inches; water table at a depth of 20 to 60 inches in places.	Moderate to high available water capacity; moderate intake rate; slightly to strongly saline-alkali.	Slight for units GoB, GwA, GsB, GxA, GtA, GpB, GrB; moderate for unit GvB, water table; moderate to severe for unit GtD, slope; severe for unit GuB, water table.
Poor to good stability; slight to high compressibility; poor to good resistance to piping.	Moderate permeability; moderately steep slopes in places.	Drainage not needed	High available water capacity; moderate intake rate; moderately steep slopes in places.	Slight on 0 to 5 percent slopes; moderate on 5 to 8 percent slopes; severe on 8 to 25 percent slopes.
Poor to fair stability; very slight to slight compressibility; poor to good resistance to piping.	Moderately rapid to rapid permeability; slopes to 15 percent.	Drainage not needed	Moderate to high available water capacity; rapid intake rate; slopes to 15 percent.	Slight on 0 to 8 percent slopes; severe on 8 to 15 percent slopes.
Poor to good stability; slight to high compressibility; poor to good resistance to piping.	Moderately slow to rapid permeability.	Drainage not needed	High to moderate available water capacity; rapid intake rate.	Slight for unit HIA; moderate for unit HIC, slope; severe for unit HhA2, moderately slow permeability.
Fair to poor stability; slight to medium compressibility; poor resistance to piping.	Moderately rapid to moderate permeability; steep slopes in places.	Drainage not needed	Moderate to high available water capacity; rapid to moderate intake rate; moderately steep slopes in places.	Slight on 0 to 5 percent slopes; moderate on 5 to 8 percent slopes; severe on 8 to 25 percent slopes.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of— Topsoil	Sand and gravel	Road fill	Hydrologic soil group	Soil Road location
Las Posas: LaC, LaC2, LaD2, LaE3, LcD2, LkD2, LkF3.	Poor: Shallow to clay.	Unsuitable: More than 50 percent fines.	Poor: A–6, A–7; stony in places.	C	High shrink-swell potential; rock at a depth of 10 to 45 inches; steep slopes in places.
Lodo: LoF2, LpE2, LpF2	Poor: Shallow to rock.	Unsuitable for sand, more than 50 percent fines; poor for gravel, 30 to 50 percent gravel.	Fair: A–4	D	Rock at a depth of 8 to 15 inches; steep slopes in places.
Madera: MaA, MaB2, MaD2, MbC2.	Poor: Shallow to clay.	Unsuitable: Mostly more than 50 percent fines.	Fair to poor: A–4, A–6, A–7.	D	High shrink-swell potential; hardpan at a depth of 10 to 36 inches; slopes to 15 percent.
Metz: MdC, MeD, MfA, MgB, MhB, MlD.	Poor: Sandy, gravelly, and subject to flooding.	Good to fair for sand, 5 to 35 percent fines; poor to unsuitable for gravel, 0 to 50 percent gravel.	Good	A	Occasional to frequent flooding.
Monserate: MmB, MmC2, MmD2, MmE3, MnD2, MnE3.	Poor: Shallow to moderately deep to hardpan; sandy clay loam subsoil.	Unsuitable: Mostly more than 50 percent fines.	Good to fair: A–4, A–6.	C	Moderate shrink-swell potential; hardpan at a depth of 10 to 36 inches; steep slopes in places.
Mottsville: MoC, MoD, MrE, MsC, MsD, MtE2.	Poor: Loamy sand that is cobbly in places.	Good to poor for sand, 0 to 45 percent fines; poor to unsuitable for gravel, 0 to 50 percent gravel.	Good	A	Moderately steep slopes in places; unit MrE subject to frequent flooding.
Murrieta: MuE	Poor: Stony and shallow to rock.	Unsuitable: More than 50 percent fines.	Poor: A–6, A–7.	D	High shrink-swell potential; rock at a depth of 12 to 20 inches; moderately steep slopes.
Oak Glen: OgD, OgE, OkD	Good in unit OkD; fair in units OgD and OgE, gravelly.	Good to poor for sand, 5 to 50 percent fines; poor to unsuitable for gravel, 5 to 50 percent gravel.	Good	B	Moderately steep slopes in places.
Pachappa: PaA, PaC2	Good	Unsuitable: Mostly more than 50 percent fines.	Fair: A–4	B	Most features favorable.
Perkins: PeC, PgB, PgC, PgD2 ..	Poor: Clay loam below a depth of 12 inches; gravelly.	Unsuitable for sand to a depth of 44 inches; fair below, 15 to 20 percent fines; good to unsuitable for gravel, 15 to 80 percent gravel.	Good to poor: A–4, A–6, A–6.	C	Slopes to 15 percent ...

interpretations—Continued

features affecting—					Soil limitations for use as a septic tank filter field
Water retention		Agricultural drainage	Irrigation		
Embankments	Reservoir area				
Poor to good stability; medium to very high compressibility; good to poor resistance to piping.	Moderate permeability; rock at a depth of 10 to 45 inches; steep slopes in places.	Drainage not needed	Low to moderate available water capacity; moderate to slow intake rate; steep slopes in places.		Severe: Moderately slow permeability.
Poor stability; medium compressibility; poor resistance to piping.	Moderate permeability; rock at a depth of 8 to 15 inches; steep slopes in places.	Drainage not needed	Low available water capacity; rapid intake rate; steep slopes in places.		Severe: Depth to bedrock; slope.
Fair to poor stability; medium to high compressibility; poor to good resistance to piping.	Very slow permeability; hardpan at a depth of 10 to 36 inches; slopes to 15 percent.	Very slow permeability; hardpan at a depth of 10 to 36 inches; slopes to 15 percent.	Low to moderately low available water capacity; moderate intake rate; slopes to 15 percent.		Severe: Very slow permeability.
Fair stability; slight compressibility; poor resistance to piping.	Rapid to very rapid permeability; slopes to 15 percent.	Drainage not needed	Low to moderate available water capacity; rapid intake rate; slopes to 15 percent.		Slight on 0 to 5 percent slopes; moderate on 5 to 8 percent slopes; severe on 8 to 15 percent slopes; unit MeD subject to flooding on all slopes.
Fair to good stability; slight to high compressibility; poor to good resistance to piping.	Moderately slow permeability over very slow permeability; hardpan at a depth of 10 to 36 inches; moderately steep slopes in places.	Moderately slow permeability over very slow permeability; hardpan at a depth of 10 to 36 inches; moderately steep slopes in places.	Low to moderate available water capacity; moderate to rapid intake rate; moderately steep slopes in places.		Severe: Very slow permeability.
Fair to poor stability; very slight to slight compressibility; good to poor resistance to piping.	Rapid permeability; steep slopes in places.	Drainage not needed	Low to moderate available water capacity; rapid to very rapid intake rate; moderately steep slopes in places.		Moderate on 2 to 8 percent slopes; severe on 8 to 25 percent slopes.
Poor to fair stability; medium to very high compressibility; poor to good resistance to piping.	Slow permeability; rock at a depth of 12 to 20 inches; moderately steep slopes.	Drainage not needed	Low available water capacity; slow intake rate; moderately steep slopes.		Severe: Slow permeability.
Fair stability; slight compressibility; poor resistance to piping.	Moderately rapid permeability; moderately steep slopes in places.	Drainage not needed	Moderate available water capacity; rapid to moderate intake rate; moderately steep slopes in places.		Severe: Slope.
Poor to good stability; slight to high compressibility; poor to good resistance to piping.	Moderate permeability	Drainage not needed	High available water capacity; moderate intake rate.		Moderate: Moderate permeability.
Poor to good stability; slight to high compressibility; poor to good resistance to piping.	Slow permeability; slopes to 15 percent.	Slow permeability	Moderate to high available water capacity; moderate intake rate; slopes to 15 percent.		Severe: Slow permeability.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Hydrologic soil group	Soil
	Topsoil	Sand and gravel	Road fill		Road location
Placentia: PlB, PlD, PmE	Poor: Shallow to clay.	Unsuitable: Mostly more than 50 percent fines.	Poor to fair: A—4, A—6.	D	High shrink-swell potential; moderately steep slopes in places.
Porterville: PoC, PrD	Poor: Clay	Unsuitable: More than 50 percent fines.	Poor: A—7	D	High shrink-swell potential; unit PrD cobbly; slopes to 15 percent.
PsC, PtB, PvD2	Poor: Clay	Unsuitable: More than 50 percent fines.	Poor: A—7	D	High shrink-swell potential; rock or sediment at a depth of 24 to 42 inches; slopes to 15 percent.
Ramona: RaA, RaB2, RaB3, RaC2, RaC3, RaD2, RaD3, RaE3, ReC2, RmE3, RnD2, RnE3. (For interpretations of Buren soils in mapping units RmE3, RnD2, and RnE3, refer to Buren series in this table.)	Fair: Clay loam below a depth of 29 inches.	Fair to unsuitable: 35 to 55 percent fines.	Fair to poor: A—4, A—6.	B	Steep slopes in places
RdD2, RdE3, RfC2	Poor: Moderately deep; clay loam below a depth of 12 inches.	Unsuitable: More than 40 percent fines.	Fair to poor: A—4, A—6.	C C	Low shrink-swell potential; unrelated sediment at a depth of 15 to 42 inches; steep slopes in places.
San Emigdio: SdD, SeA, SeC2, SeD2, SfA, SgA, SgC, SgD2.	Good	Unsuitable: All units more than 50 percent fines, except unit SfA, which is 15 to 20 percent fines and fair for sand.	Good to poor: A—4, A—6.	B	Subject to occasional to frequent flooding; slopes to 15 percent.
San Timoteo: SmE2, SmF2	Poor: Moderately deep.	Unsuitable: More than 50 percent fines.	Fair: A—4	C	Soft sandstone at a depth of 20 to 30 inches; steep slopes.
Sheephead: SnD2, SpG2	Poor: Shallow to rock.	Unsuitable: More than 50 percent fines.	Fair: A—4	C	Rock at a depth of 10 to 20 inches; steep slopes.
Soboba: SrE, SsD	Poor: Stony, cobbly, and very gravelly sand.	Good for sand and gravel.	Good	A	Subject to flooding; moderately steep slopes in places; cobbly and stony.
Soper: StF2, SuF2	Poor: Moderately deep.	Unsuitable: More than 50 percent fines.	Fair to poor: A—4, A—7.	C	Moderate shrink-swell potential; conglomerate at a depth of 20 to 36 inches; steep slopes.

interpretations—Continued

features affecting—				Soil limitations for use as a septic tank filter field
Water retention		Agricultural drainage	Irrigation	
Embankments	Reservoir area			
Fair to poor stability; very high to slight compressibility; poor to good resistance to piping.	Very slow permeability; moderately steep slopes in places.	Very slow permeability	Low available water capacity; moderate intake rate; moderately steep slopes in places.	Severe: Very slow permeability.
Poor to good stability; medium to very high compressibility; poor to good resistance to piping.	Slow permeability; slopes to 15 percent.	Drainage not needed	Moderate to high available water capacity; slow intake rate; slopes to 15 percent.	Severe: Slow permeability.
Poor to good stability; medium to very high compressibility; poor to good. resistance to piping.	Slow permeability; rock or consolidated sediment at depth of 24 to 42 inches; slopes to 15 percent.	Drainage not needed	Low to moderate available water capacity; slow intake rate; slopes to 15 percent.	Severe: Slow permeability.
Poor to good stability; slight to high compressibility; poor to good resistance to piping.	Moderately slow permeability; steep slopes in places.	Drainage not needed	High available water capacity; moderate intake rate; steep slopes in places.	Severe: Moderately slow permeability.
Poor to good stability; slight to high compressibility; poor to good resistance to piping.	Moderately slow permeability; unrelated sediment at a depth of 15 to 42 inches; steep slopes in places.	Drainage not needed	Low to moderate available water capacity; moderate intake rate; steep slopes in places.	Severe: Moderately slow permeability.
Poor to fair stability; slight to medium compressibility; poor resistance to piping.	Moderate to moderately rapid permeability; slopes to 15 percent.	Drainage not needed	Moderate to high available water capacity; moderate intake rate; slopes to 15 percent.	Slight on units SeA, SfA, SgA; moderate on units SeC2 and SgC, slope; severe on units SdD, SeD2, and SgD2, slope.
Poor to good stability; medium to high compressibility; poor to good resistance to piping.	Moderate permeability; soft sandstone at a depth of 20 to 30 inches; steep slopes in places.	Drainage not needed	Low available water capacity; moderate intake rate; steep slopes.	Severe: Depth to bedrock; slope.
Poor stability; medium compressibility; poor resistance to piping.	Moderately rapid permeability; rock at a depth of 10 to 20 inches; steep slopes in some places.	Drainage not needed	Very low to low available water capacity; rapid intake rate; steep slopes.	Severe: Depth to bedrock; slope.
Good to fair stability; very slight compressibility; good resistance to piping.	Rapid permeability; moderately steep slopes in places.	Drainage not needed	Low available water capacity; very rapid intake rate; moderately steep slopes in places.	Severe: Slope.
Poor to good stability; slight to high compressibility; poor to good resistance to piping.	Moderately slow permeability; conglomerate to a depth of 20 to 36 inches; steep slopes.	Drainage not needed	Very low to low available water capacity; moderate intake rate; steep slopes.	Severe: Moderately slow permeability; slope.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as a source of—			Hydrologic soil group	Soil
	Topsoil	Sand and gravel	Road fill		Road location
Temescal: TaF2, TbF2	Poor: Shallow to rock.	Unsuitable: More than 50 percent fines.	Fair: A–4	D	Moderate shrink-swell potential; rock at a depth of 10 to 20 inches; steep slopes.
Tollhouse: TfF2, ThD2, ThE2	Poor: Shallow to rock.	Good to fair for sand, 0 to 30 percent fines; poor to unsuitable for gravel, 5 to 30 percent gravel.	Good	D	Rock at a depth of 10 to 20 inches; steep slopes in places.
Traver: Tp2, Tr2, Ts, Tt2	Poor: Slightly to strongly saline-alkali.	Poor to unsuitable for sand, mostly more than 40 percent fines; unsuitable for gravel, less than 25 percent gravel.	Fair to poor: A–4, A–6, A–7.	B–C	Most features favorable.
Tujunga: TuB, TvC, TwC	Poor: Sand and gravelly sand.	Good to fair for sand, 0 to 20 percent fines; poor to unsuitable for gravel, 0 to 50 percent gravel.	Good	A	Subject to flooding
Vallecitos: VaE3, VdF2	Poor: Shallow to rock.	Unsuitable: More than 50 percent fines.	Fair to poor: A–4, A–6.	D	High shrink-swell potential; rock at a depth of 10 to 20 inches; steep slopes.
Vallecitos, thick solum variant: VeC2, VeD2, VeF2.	Poor: Sandy clay at a depth of 8 inches.	Unsuitable: More than 45 percent fines.	Fair to poor: A–4, A–6, A–7.	C	High shrink-swell potential; rock at a depth of 20 to 50 inches; steep slopes in places.
Visalia: VlC2, VmA, VmC	Good	Poor for sand, 25 to 35 percent fines; unsuitable for gravel, less than 25 percent gravel.	Good	C	Most features favorable.
Vista: VsC, VsD2, VsF2, VtF2	Fair: Moderately deep	Poor for sand, 25 to 35 percent fines; unsuitable for gravel, less than 25 percent gravel.	Good	B	Rock at a depth of 20 to 36 inches; steep slopes in places.
Waukena: Wa, Wb, Wc, Wd	Poor: Saline-alkali.	Unsuitable: Mostly more than 50 percent fines.	Poor: A–6, A–7.	D	Most features favorable.
Willows:					
Wf, Wg, Wh	Poor: Silty clay	Unsuitable: More than 50 percent fines.	Poor: A–7	D	High shrink-swell potential.
Wm, Wn	Poor: Silty clay	Unsuitable: More than 50 percent fines.	Poor: A–7	D	High shrink-swell potential; cemented lenses at a depth of 36 to 48 inches.

interpretations—Continued

features affecting—					Soil limitations for use as a septic tank filter field
Water retention		Agricultural drainage	Irrigation		
Embankments	Reservoir area				
Poor to good stability; medium to high compressibility; poor to good resistance to piping.	Moderate permeability; rock at a depth of 10 to 20 inches; steep slopes.	Drainage not needed	Very low to low available water capacity; moderate intake rate; steep slopes.		Severe: Depth to bedrock; slope.
Poor to good stability; slight to very slight compressibility; fair to poor resistance to piping.	Rapid permeability; rock at a depth of 10 to 20 inches; steep slopes in places.	Drainage not needed	Very low to low available water capacity; rapid intake rate; steep slopes in places.		Severe: Depth to bedrock; slope.
Fair to poor stability; slight to medium compressibility; poor resistance to piping.	Moderate and moderately slow permeability.	Moderate and moderately slow permeability; water table at a depth of more than 5 feet.	High available water capacity; moderate intake rate; slightly to strongly saline-alkali.		Severe: Moderate and moderately slow permeability.
Poor to fair stability; very slight to slight compressibility; fair to poor resistance to piping.	Rapid permeability	Drainage not needed	Low available water capacity; rapid intake rate.		Slight in unit TuB; moderate in unit TwC, slope; severe in unit TvC, flooding.
Poor to good stability; medium to high compressibility; good to poor resistance to piping.	Moderately slow permeability; rock at a depth of 10 to 20 inches; steep slopes.	Drainage not needed	Low available water capacity; moderate intake rate; steep slopes.		Severe: Depth to bedrock; slope.
Poor to good stability; slight to high compressibility; poor to good resistance to piping.	Moderately slow permeability; rock at a depth of 20 to 50 inches; steep slopes in places.	Drainage not needed	Low to moderate available water capacity; moderate intake rate; steep slopes in places.		Severe: Moderately slow permeability.
Fair stability; slight compressibility; poor resistance to piping.	Moderately rapid permeability.	Drainage not needed	High available water capacity; moderate intake rate.		Slight on unit VmA; moderate on units VlC2 and VmC, slope.
Fair stability; slight compressibility; poor to good resistance to piping.	Moderately rapid permeability; rock at a depth of 20 to 36 inches; steep slopes in places.	Drainage not needed	Low to moderate available water capacity; rapid intake rate; steep slopes in places.		Severe: Depth to bedrock; slope.
Poor to good stability; slight to high compressibility; poor to good resistance to piping.	Slow permeability	Slow permeability; water table at a depth of more than 5 feet.	Moderate to high available water capacity; rapid to moderate intake rate; slightly to strongly saline-alkali.		Severe: Slow permeability.
Poor to fair stability; high to very high compressibility; poor to good resistance to piping.	Slow permeability	Slow permeability; water table at a depth of more than 5 feet.	High available water capacity; very slow intake rate; slightly to strongly saline-alkali.		Severe: Slow permeability.
Poor to fair stability; high to very high compressibility; poor to good resistance to piping.	Slow permeability; cemented lenses at a depth of 36 to 48 inches.	Slow permeability; cemented lenses at a depth of 36 to 48 inches; water table at a depth of more than 5 feet.	Moderate available water capacity; very slow intake rate; moderately to strongly saline-alkali.		Severe: Slow permeability.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as a source of—			Hydrologic soil group	Soil
	Topsoil	Sand and gravel	Road fill		Road location
Wyman: WxD2, WyC2	Good in unit WxD2, fair in unit WyC2; clay loam subsoil.	Unsuitable: More than 50 percent fines.	Good to poor: A—2, A—6.	B	Moderate shrink-swell potential; slopes to 15 percent.
Yokohl: YbC, YbD2, YbE3, YkE2.	Poor: Shallow to clay.	Unsuitable: More than 50 percent fines; indurated hardpan at a depth of 10 to 40 inches.	Fair to poor: A—4, A—7.	D	High shrink-swell potential; hardpan at a depth of 10 to 40 inches; steep slopes in places.
Ysidora: YrD2, YsC2, YsE2, YsE3.	Poor: Shallow to clay loam and gravelly clay loam.	Unsuitable: More than 50 percent fines.	Fair to poor: A—4, A—6.	C	Moderate shrink-swell potential; hardpan at a depth of 10 to 36 inches; moderately steep slopes in places.

type of clay in the soil layers. Some clays in the soils expand when moisture is added, and they shrink when they are dry. Soils that contain a large amount of clay generally have a high shrink-swell potential. The coarser textured soils have a low shrink-swell potential. The type of clay in a soil may have greater affect than the amount of clay in the shrink-swell potential. High shrink-swell characteristics affect construction of roads, foundations of structures, and sites for reservoirs.

Engineering interpretations

Table 6 rates the soils according to their suitability as a source of topsoil, sand, gravel, and road fill. Then the hydrologic soil group is given, followed by features that affect the suitability of the soils as sites for roads, water retention structures, agricultural drainage, and irrigation systems. Badland, Gullied land, Riverwash, Rock land, Rough broken land, Terrace escarpments, and Wet alluvial land are not listed in the table. These land types are too variable in characteristics to be rated or otherwise are not suitable for engineering.

All engineering interpretations are based on a soil depth of 5 feet or of less than 5 feet if rock is encountered at a depth of less than 5 feet. In a few areas frost is a hazard. Interpretations of the data on road location, however, were made without considering the frost hazard. Because the estimates in table 6 are for a typical profile, some variations from the values given should be expected. "Over" used in relation to permeability in some of the columns means that permeability in the upper part of the profile is different from that in the lower part. A description of a typical profile for each series in the survey area is in the section "Descriptions of the Soils."

The ratings used for soils as a source of topsoil, sand, gravel, and road fill are *good*, *fair*, *poor*, or *unsuitable*.

Ratings of the soils as a source of topsoil are for use on slopes, shoulders of roads, and along ditches. The ratings are according to suitability of the soils for growth of vegetation.

In rating the soils as a source of sand and gravel, their suitability as a source of construction material was considered. Suitability for specific engineering use of the soils must be determined by onsite investigation. The suitability of the soils for use as road fill was based on estimates of the appropriate soil properties and on test data in table 4.

Engineers and soil scientists have classified the soil series in the survey area into four hydrologic groups. The grouping is based on estimates of the intake of water during the latter part of a storm of long duration, after the soil profile is wet and has an opportunity to swell, without the protective effect of any vegetation. Also considered are depth to the seasonal high water table and to a slowly permeable layer. The grouping is tentative and subject to change as further data and experience are gained. The four groups are:

Group A—Low runoff potential: This group consists of soils that have a rapid infiltration rate even when thoroughly wetted. These soils are mainly deep, are well drained to excessively drained, and consist of sand, gravel, or both.

Group B—Moderately low runoff potential: This group consists of soils that have a moderate infiltration rate when thoroughly wetted. These soils are mostly moderately deep to deep, moderately well drained to well drained, and moderately fine textured to moderately coarse textured. They also have moderately slow permeability to moderately rapid permeability, and they have a moderate rate of water transmission.

Group C—Moderately high runoff potential: This group consists of soils that have a slow infiltration rate when thoroughly wetted. Most of these soils have a layer that impedes downward movement of water, have moderately fine texture to fine texture, and have a water table at a moderate depth. They are mostly well drained and moderately well drained, but some are somewhat poorly drained. These soils may have slowly permeable to very

interpretations—Continued

features affecting—					Soil limitations for use as a septic tank filter field
Water retention		Agricultural drainage	Irrigation		
Embankments	Reservoir area				
Poor to good stability; medium to high compressibility; poor to good resistance to piping.	Moderately slow permeability; slopes to 15 percent.	Drainage not needed	Moderate to high available water capacity; moderate intake rate; slopes to 15 percent.		Severe: Moderately slow permeability.
Poor to good stability; medium to high compressibility; poor to good resistance to piping.	Slow permeability over very slow permeability; hardpan at a depth of 10 to 40 inches; moderately steep slopes in places.	Slow permeability over very slow permeability; hardpan at a depth of 10 to 40 inches.	Low to moderate available water capacity; moderate intake rate; moderately steep slopes in places.		Severe: Slow over very slow permeability.
Poor to good stability; medium to high compressibility; poor to good resistance to piping.	Moderately slow permeability over very slow permeability; hardpan at a depth of 10 to 36 inches; moderately steep slopes in places.	Moderately slow permeability over very slow permeability; hardpan at a depth of 10 to 36 inches.	Very low to moderate available water capacity; moderate intake rate; moderately steep slopes in places.		Severe: Moderately slow over very slow permeability.

slowly permeable material, such as a hardpan, or hard bedrock, at a depth of 20 to 40 inches.

Group D—High runoff potential: This group consists of soils that have a slow infiltration rate when thoroughly wetted. These soils are mainly clay and have a high swelling potential; have a permanent high water table; have a claypan or clay layer at or near the surface; and are shallow over nearly impervious material. They have a very slow rate of water transmission.

Some of the features that affect the location of roads are topography, rock outcrops, and plasticity.

In locating a suitable site for farm ponds and reservoirs, the presence of suitable material for the core and embankment are the chief considerations. Soils that are resistant to piping and settlement cracking, that are readily compressible, that have a low seepage rate, and that are slowly permeable are desirable as sites. *Compressibility* is the volume change produced by application of a static external load. The continuous movement of water through soil that may result in the removal of soluble solids, internal erosion, or channeling is referred to as piping. Piping generally occurs gradually and is often not apparent until failure is imminent. Features that would adversely affect the location of a farm pond or reservoir, such as substratum and underlying material are also given.

Internal soil drainage is expressed in terms of the relative permeability of the soil material. It is based on the soil permeability classes as used by the Soil Conservation Service (*11*). Commonly the percolation rate of a soil is based on the least permeable horizon in the solum or immediate substratum.

Suitability of a soil for irrigation is based chiefly on its rate of intake and its water-holding capacity. Also considered are permeability, need for leaching, soil depth, presence of salt or alkali, and textural classification of the soil profile. The intake rate is the rate of irrigation water movement into the soils.

Ratings used to describe limitations to use of a soil as a septic tank filter field are "slight," moderate," or "severe." These ratings are based on permeability, slope, depth to bedrock or water table, drainage, and hazard of flooding. A filter field is part of the septic soil absorption system for disposal of sewage on the site. It consists of subsurface tile lain in such a way that effluent from the septic tank is distributed with reasonable uniformity into the soil.

Recreational Development

In selecting a site for recreational development, the suitability of the soils in each site for such use must be determined. Some of the more common properties affecting the use of the soils for recreational purposes are texture of the surface layer; slope; drainage; flooding; the number of stones and rocks in and on the soils; and depth to water table, to bedrock, or to other restrictive layers. On basis of these and related characteristics, soil scientists and engineers have rated the soils of the Western Riverside Area for use as play areas, camp areas, and picnic areas. The rating and the nature of the soil limitations that influenced the ratings are shown in table 7.

Limitations of the soils for the specified uses have been rated as slight, moderate, or severe. The soil features are given major consideration in the ratings. Not considered are location in relation to transportation lines, the water supply, and sanitary facilities. A rating of *slight* means that the soil has few, if any, limitations for the use specified. A rating of *moderate* means that the soil has one or more properties that limit its use for the purpose specified. Correction of the limiting factors increases the cost of installing and maintaining the necessary practices. A rating of *severe* means that the soil has one or more properties that limit seriously its use for the purpose specified. Correction of some of the limiting factors is possible, but correction of others is prohibitive in cost.

TABLE 7.—*Soil interpretations for recreational uses*

Soil name	Recreational uses		
	Play areas	Camp areas	Picnic areas
Altamont clay, 25 to 50 percent slopes.	Severe: Clay	Severe: Clay	Severe: Clay.
Altamont clay, 5 to 15 percent slopes.	Severe: Clay	Severe: Clay	Severe: Clay.
Altamont clay, 15 to 25 percent slopes, eroded.	Severe: Clay	Severe: Clay	Severe: Clay.
Altamont cobbly clay, 8 to 35 percent slopes.	Severe: Cobbly clay	Severe: Cobbly clay	Severe: Cobbly clay.
Anza fine sandy loam, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Slopes 2 to 8 percent.	Moderate: Slopes 2 to 8 percent.
Anza loam, 0 to 2 percent slopes	Slight	Slight	Slight.
Anza loam, 2 to 8 percent slopes	Severe: Slopes more than 5 percent.	Moderate: Slopes 2 to 8 percent.	Moderate: Slopes 2 to 8 percent.
Arbuckle gravelly loam, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Moderately slow permeability.	Moderate: Gravelly loam.
Arbuckle gravelly loam, 8 to 15 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 9 percent.	Moderate: Gravelly loam.
Arbuckle gravelly loam, 15 to 25 percent slopes.	Severe: Slopes more than 15 percent.	Severe: Slopes more than 15 percent.	Severe: Slopes more than 15 percent.
Arbuckle loam, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Slopes to 8 percent.	Moderate: Slopes to 8 percent.
Arbuckle loam, 8 to 15 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Arbuckle gravelly loam, 2 to 25 percent slopes, severely slopes.	Severe: Slopes to 25 percent.	Severe: Slopes to 25 percent.	Severe: Slopes to 25 percent.
Arbuckle gravelly clay loam, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Moderately slow permeability.	Moderate: Gravelly clay loam.
Arlington loam, 2 to 5 percent slopes.	Moderate: Moderately deep.	Slight	Slight.
Arlington fine sandy loam, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Slopes to 8 percent.	Moderate: Slopes to 8 percent.
Arlington fine sandy loam, 8 to 15 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Arlington fine sandy loam, deep, 0 to 2 percent slopes.	Slight	Slight	Slight.
Arlington fine sandy loam, deep, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Slopes to 8 percent.	Moderate: Slopes to 8 percent.
Arlington fine sandy loam, deep, 8 to 15 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Arlington loam, deep, 0 to 5 percent slopes.	Moderate: Slopes to 5 percent.	Slight	Slight.
Arlington loam, deep, 5 to 15 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 5 to 15 percent.
Arlington and Greenfield fine sandy loams, 2 to 8 percent slopes, eroded:			
Arlington part	Severe: Slopes more than 5 percent.	Moderate: Slopes 2 to 8 percent.	Moderate: Slopes 2 to 8 percent.
Greenfield part	Severe: Slopes more than 5 percent.	Moderate: Slopes 2 to 8 percent.	Moderate: Slopes 2 to 8 percent.
Arlington and Greenfield fine sandy loams, 8 to 15 percent slopes, eroded:			
Arlington part	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Greenfield part	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Arlington and Greenfield fine sandy loams, 15 to 35 percent slopes, severely eroded:			
Arlington part	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Greenfield part	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Auld clay, 2 to 8 percent slopes	Severe: Clay	Severe: Clay	Severe: Clay.
Auld clay, 8 to 15 percent slopes	Severe: Clay	Severe: Clay	Severe: Clay.
Auld cobbly clay, 8 to 50 percent slopes.	Severe: Cobbly clay	Severe: Cobbly clay	Severe: Cobbly clay.
Badland	Severe: Very shallow to rock.	Severe: Very shallow ro rock.	Severe: Very shallow to rock.
Bishop silt loam	Severe: Poorly drained	Severe: Poorly drained	Severe: Poorly drained.
Bonsall fine sandy loam, 2 to 8 percent slopes.	Severe: Very slow permeability.	Severe: Very slow permeability.	Moderate: Slopes 2 to 8 percent.

Table 7.—*Soil interpretations for recreational uses—Continued*

Soil name	Recreational uses		
	Play areas	Camp areas	Picnic areas
Bonsall fine sandy loam, 8 to 15 percent slopes.	Severe: Very slow permeability.	Severe: Very slow permeability.	Moderate: Slopes 8 to 15 percent.
Bosanko clay, 2 to 8 percent slopes.	Severe: Clay	Severe: Clay	Severe: Clay.
Bosanko clay, 8 to 15 percent slopes.	Severe: Clay	Severe: Clay	Severe: Clay.
Buchenau loam, slightly saline-alkali, 0 to 2 percent slopes.	Slight	Slight	Slight.
Buchenau loam, slightly saline-alkali, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Slopes 2 to 8 percent.	Moderate: Slopes 2 to 8 percent.
Buchenau silt loam, 2 to 8 percent slopes, eroded.	Severe: Silt loam dust problem.	Severe: Silt loam dust problem.	Severe: Silt loam dust problem.
Bull Trail sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Bull Trail sandy loam, 5 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Moderately deep.	Moderate: Slopes 5 to 8 percent.
Bull Trail sandy loam, 8 to 25 percent slopes, severely eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Bull Trail stony sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Bull Trail stony sandy loam, 8 to 25 percent slopes, severely eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Buren fine sandy loam, 2 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Moderately deep.	Moderate: Slopes 2 to 8 percent.
Buren fine sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Buren loam, 5 to 15 percent slopes, severely eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Buren loam, deep, 2 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Moderately deep.	Moderate: Slopes 2 to 8 percent.
Cajalco fine sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Cajalco fine sandy loam, 2 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Slopes 2 to 8 percent.	Moderate: Slopes 2 to 8 percent.
Cajalco fine sandy loam, 15 to 35 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Cajalco rocky fine sandy loam, 5 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes 5 to 15 percent.	Moderate: Slopes 5 to 15 percent.
Cajalco rocky fine sandy loam, 15 to 50 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Calpine sandy loam, 2 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Slopes 2 to 8 percent.	Moderate: Slopes 2 to 8 percent.
Calpine sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Calpine loam, 2 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Slopes 2 to 8 percent.	Moderate: Slopes 2 to 8 percent.
Chino silt loam, drained	Severe: Silt loam dust problem.	Severe: Silt loam dust problem.	Severe: Silt loam dust problem.
Chino silt loam, drained, saline-alkali.	Severe: Silt loam dust problem.	Severe: Silt loam dust problem.	Severe: Silt loam dust problem.
Chino silt loam, strongly saline-alkali.	Severe: Poorly drained	Severe: Poorly drained	Severe: Poorly drained.
Cieneba rocky sandy loam, 15 to 50 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Cieneba rocky sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Rocky.
Cieneba sandy loam, 5 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Shallow	Moderate: Slopes 5 to 8 percent.
Cieneba sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Cieneba sandy loam, 15 to 50 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Cortina gravelly coarse sandy loam, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Gravelly coarse sandy loam.	Moderate: Slopes 2 to 8 percent.
Cortina gravelly loamy sand, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Gravelly loamy sand.	Moderate: Gravelly loamy sand.
Cortina cobbly loamy sand, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Cobbly loamy sand.	Moderate: Cobbly loamy sand.
Cortina sandy loam, 0 to 2 percent slopes.	Moderate: Very rapid permeability.	Moderate: Very rapid permeability.	Slight.
Cortina gravelly sandy loam, 0 to 2 percent slopes.	Severe: More than 5 percent gravel.	Moderate: Gravelly sandy loam.	Slight.
Cortina cobbly sandy loam, 2 to 12 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Cobbly	Moderate: Cobbly.

Table 7.—*Soil interpretations for recreational uses—Continued*

Soil name	Recreational uses: Play areas	Camp areas	Picnic areas
Crafton rocky sandy loam, 25 to 50 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Crafton fine sandy loam, 15 to 35 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Crafton rocky fine sandy loam, 15 to 25 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Crouch rocky sandy loam, 25 to 50 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Crouch rocky sandy loam, 8 to 25 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Crouch loamy sand, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Crouch sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Crouch sandy loam, 15 to 25 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Delhi fine sand, 2 to 15 percent slopes, wind-eroded.	Severe: Fine sand	Severe: Fine sand	Severe: Fine sand.
Delhi loamy fine sand, 0 to 2 percent slopes.	Moderate: Loamy fine sand	Moderate: Loamy fine sand	Moderate: Loamy fine sand.
Dello loamy fine sand, 0 to 2 percent slopes.	Moderate: Loamy fine sand	Moderate: Loamy fine sand	Moderate: Loamy fine sand.
Dello loamy sand, 0 to 5 percent slopes.	Moderate: Loamy sand	Moderate: Loamy sand	Moderate: Loamy sand.
Dello loamy sand, poorly drained, 0 to 2 percent slopes.	Severe: Poorly drained	Severe: Poorly drained	Severe: Poorly drained.
Dello loamy sand, gravelly substratum, 0 to 5 percent slopes.	Moderate: Loamy sand	Moderate: Loamy sand	Moderate: Loamy sand.
Dello loamy fine sand, saline-alkali, 0 to 5 percent slopes.	Moderate: Loamy fine sand	Moderate: Loamy fine sand	Moderate: Loamy fine sand.
Dello loamy fine sand, gravelly substratum, 0 to 2 percent slopes.	Moderate: Loamy fine sand	Moderate: Loamy fine sand	Moderate: Loamy fine sand.
Domino silt loam, saline-alkali	Severe: Silt loam dust problem.	Severe: Silt loam dust problem.	Severe: Silt loam dust problem.
Domino fine sandy loam, eroded	Moderate: Moderately deep	Moderate: Moderately deep	Moderate: Somewhat poorly drained.
Domino fine sandy loam, saline-alkali.	Moderate: Moderately deep	Moderate: Moderately deep	Moderate: Somewhat poorly drained.
Domino silt loam	Severe: Silt loam dust problem.	Severe: Silt loam dust problem.	Severe: Silt loam dust problem.
Domino silt loam, strongly saline-alkali.	Severe: Silt loam dust problem.	Severe: Silt loam dust problem.	Severe: Silt loam dust problem.
Escondido fine sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Escondido fine sandy loam, 2 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Moderately deep	Moderate: Slopes 2 to 8 percent.
Escondido fine sandy loam, 15 to 25 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Escondido rocky fine sandy loam, 8 to 50 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Exeter sandy loam, 0 to 2 percent slopes.	Moderate: Moderately deep.	Moderate: Moderately deep	Slight.
Exeter sandy loam, 2 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Moderately deep	Moderate: Slopes 2 to 8 percent.
Exeter sandy loam, slightly saline-alkali, 0 to 5 percent slopes.	Moderate: Moderately deep	Moderate: Moderately deep	Slight.
Exeter sandy loam, deep, 0 to 2 percent slopes.	Slight	Slight	Slight.
Exeter sandy loam, deep, 2 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Moderately deep	Moderate: Slopes 2 to 8 percent.
Exeter very fine sandy loam, 0 to 5 percent slopes.	Moderate: Moderately deep	Moderate: Moderately deep	Slight.
Exeter very fine sandy loam, deep, 0 to 5 percent slopes.	Moderate: Slopes 0 to 5 percent.	Slight	Slight.
Fallbrook sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Fallbrook sandy loam, 15 to 25 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Fallbrook sandy loam, shallow, 5 to 8 percent slopes, eroded.	Severe: Shallow to weathered rock.	Severe: Shallow to weathered rock.	Moderate: Slopes 5 to 8 percent.
Fallbrook sandy loam, shallow, 15 to 35 percent slopes, eroded.	Severe: Shallow to weathered rock; rocky.	Severe: Shallow to weathered rock; rocky.	Severe: Slopes more than 15 percent.

Table 7.—*Soil interpretations for recreational uses—Continued*

Soil name	Recreational uses		
	Play areas	Camp areas	Picnic areas
Fallbrook rocky sandy loam, shallow, 8 to 15 percent slopes, eroded.	Severe: Shallow to weathered rock; rocky.	Severe: Shallow to weathered rock; rocky.	Moderate: Rocky.
Fallbrook rocky sandy loam, 15 to 50 percent slopes, eroded.	Severe: Shallow to weathered rock; rocky.	Severe: Shallow to weathered rock; rocky.	Severe: Slopes more than 15 percent.
Fallbrook fine sandy loam, 2 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Slopes 2 to 8 percent.	Moderate: Slopes 2 to 8 percent.
Fallbrook fine sandy loam, shallow, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Friant rocky fine sandy loam, 25 to 50 percent slopes, eroded.	Severe: Shallow to weathered rock; rocky.	Severe: Shallow to weathered rock; rocky.	Severe: Slopes more than 15 percent.
Friant rocky fine sandy loam, 8 to 25 percent slopes, eroded.	Severe: Shallow to weathered rock; rocky.	Severe: Shallow to weathered rock; rocky.	Severe: Slopes to 25 percent.
Friant fine sandy loam, 5 to 25 percent slopes, eroded.	Severe: Shallow to weathered rock.	Severe: Shallow to weathered rock.	Severe: Slopes to 25 percent.
Garretson gravelly very fine sandy loam, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Gravelly very fine sandy loam.	Moderate: Gravelly very fine sandy loam.
Garretson very fine sandy loam, 0 to 2 percent slopes.	Slight	Slight	Slight.
Garretson very fine sandy loam, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Slopes 2 to 8 percent.	Moderate: Slopes 2 to 8 percent.
Garretson very fine sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Garretson gravelly very fine sandy loam, 0 to 2 percent slopes.	Moderate: Gravelly very fine sandy loam.	Moderate: Gravelly very fine sandy loam.	Moderate: Gravelly very fine sandy loam.
Garretson gravelly very fine sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Gravelly very fine sandy loam.
Gaviota very fine sandy loam, 15 to 50 percent slopes, eroded.	Severe: Shallow to rock	Severe: Shallow to rock	Severe: Slopes more than 15 percent.
Gaviota rocky fine sandy loam, 25 to 75 percent slopes, severely eroded.	Severe: Shallow to rock; rocky.	Severe: Shallow to rock; rocky.	Severe: Slopes more than 15 percent.
Gaviota rocky very fine sandy loam, 25 to 50 percent slopes, eroded.	Severe: Shallow to rock; rocky.	Severe: Shallow to rock; rocky.	Severe: Slopes more than 15 percent.
Gorgonio gravelly loamy fine sand, 2 to 15 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 2 to 15 percent.
Gorgonio loamy sand, 0 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Loamy sand	Moderate: Loamy sand.
Gorgonio loamy sand, 8 to 15 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Loamy sand.
Gorgonio loamy sand, channeled, 2 to 15 percent slopes.	Severe: Flooded	Severe: Flooded	Severe: Flooded.
Gorgonio loamy sand, deep, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Loamy sand	Moderate: Loamy sand.
Gorgonio cobbly loamy fine sand, 2 to 15 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 2 to 15 percent.
Grangeville loamy fine sand, drained, 0 to 5 percent slopes.	Moderate: Slopes 0 to 5 percent.	Slight	Slight.
Grangeville sandy loam, drained, saline-alkali, 0 to 5 percent slopes.	Moderate: Slopes 0 to 5 percent.	Slight	Slight.
Grangeville sandy loam, sandy substratum, drained, 0 to 5 percent slopes.	Moderate: Slopes 0 to 5 percent.	Slight	Slight.
Grangeville sandy loam, sandy substratum, drained, saline-alkali, 0 to 5 percent slopes.	Moderate: Slopes 0 to 5 percent.	Slight	Slight.
Grangeville fine sandy loam, drained, 0 to 2 percent slopes.	Slight	Slight	Slight.
Grangeville fine sandy loam, drained, 5 to 15 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 5 to 15 percent.
Grangeville fine sandy loam, poorly drained, saline-alkali, 0 to 5 percent slopes.	Severe: Poorly drained	Severe: Poorly drained	Severe: Poorly drained.
Grangeville fine sandy loam, saline-alkali, 0 to 5 percent slopes.	Moderate: Somewhat poorly drained.	Moderate: Somewhat poorly drained.	Moderate: Somewhat poorly drained.
Grangeville fine sandy loam, loamy substratum, drained, 0 to 2 percent slopes.	Moderate: Dust problem	Moderate: Dust problem	Moderate: Dust problem.

Table 7.—*Soil interpretations for recreational uses—Continued*

Soil name	Recreational uses		
	Play areas	Camp areas	Picnic areas
Grangeville fine sandy loam, loamy substratum, drained, saline-alkali, 0 to 2 percent slopes.	Moderate: Dust problem	Moderate: Dust problem	Moderate: Dust problem ...
Greenfield sandy loam, 2 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Slopes 2 to 8 percent.	Moderate: Slopes 2 to 8 percent.
Greenfield sandy loam, 0 to 2 percent slopes.	Slight	Slight	Slight.
Greenfield sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Greenfield sandy loam, 15 to 25 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Gullied land	Severe: Very shallow to rock.	Severe: Very shallow to rock.	Severe: Very shallow to rock.
Hanford coarse sandy loam, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Slopes 2 to 8 percent.	Moderate: Slopes 2 to 8 percent.
Hanford loamy fine sand, 0 to 8 percent slopes.	Moderate: Loamy fine sand ..	Moderate: Loamy fine sand ..	Moderate: Loamy fine sand.
Hanford coarse sandy loam, 0 to 2 percent slopes.	Slight	Slight	Slight.
Hanford coarse sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Hanford cobbly coarse sandy loam, 2 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Cobbly loam.
Hanford coarse sandy loam, deep, 2 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Slopes 2 to 8 percent.	Moderate: Slopes 2 to 8 percent.
Hanford sandy loam, 2 to 15 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 2 to 15 percent.
Hanford fine sandy loam, 0 to 2 percent slopes.	Slight	Slight	Slight.
Hilmar loamy sand, 0 to 2 percent slopes, eroded.	Moderate: Loamy sand........	Moderate: Loamy sand........	Moderate: Loamy sand.
Hilmar loamy very fine sand, 0 to 2 percent slopes.	Moderate: Loamy very fine sand.	Moderate: Loamy very fine sand.	Moderate: Loamy very fine sand.
Hilmar loamy very fine sand, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Loamy very fine sand.	Moderate: Loamy very fine sand.
Honcut sandy loam, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Slopes 2 to 8 percent.	Moderate: Slopes 2 to 8 percent.
Honcut sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Honcut loam, 2 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Slopes 2 to 8 percent.	Moderate: Slopes 2 to 8 percent.
Honcut cobbly sandy loam, 2 to 25 percent slopes.	Severe: Flooded	Severe: Flooded	Severe: Flooded.
Las Posas loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Las Posas loam, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Moderately deep ..	Moderate: Slopes 2 to 8 percent.
Las Posas loam, 5 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Moderately deep ..	Moderate: Slopes 5 to 8 percent.
Las Posas loam, 8 to 25 percent slopes, severely eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Las Posas stony loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Las Posas rocky loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Las Posas rocky loam, 15 to 50 percent slopes, severely eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Lodo rocky loam, 8 to 25 percent slopes, eroded.	Severe: Shallow to rock; rocky.	Severe: Shallow to rock; rocky.	Severe: Slopes more than 15 percent.
Lodo rocky loam, 25 to 50 percent slopes, eroded.	Severe: Shallow to rock; rocky.	Severe: Shallow to rock; rocky.	Severe: Slopes more than 15 percent.
Lodo gravelly loam, 15 to 50 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Madera fine sandy loam, 0 to 2 percent slopes.	Severe: Very slow permeability.	Severe: Very slow permeability.	Slight.
Madera fine sandy loam, 2 to 5 percent slopes, eroded.	Severe: Very slow permeability.	Severe: Very slow permeability.	Slight.
Madera fine sandy loam, 5 to 15 percent slopes, eroded.	Severe: Very slow permeability.	Severe: Very slow permeability.	Moderate: Slopes 5 to 15 percent.
Madera fine sandy loam, shallow, 2 to 8 percent slopes, eroded.	Severe: Very slow permeability.	Severe: Very slow permeability.	Slight.
Metz loamy fine sand, 0 to 2 percent slopes.	Moderate: Loamy fine sand ..	Moderate: Loamy fine sand ..	Moderate: Loamy fine sand.

Table 7.—*Soil interpretations for recreational uses—Continued*

Soil name	Recreational uses		
	Play areas	Camp areas	Picnic areas
Metz loamy fine sand, gravelly sand substratum, 0 to 5 percent slopes.	Moderate: Loamy fine sand	Moderate: Loamy fine sand	Moderate: Loamy fine sand.
Metz loamy fine sand, sandy loam substratum, 0 to 5 percent slopes.	Moderate: Loamy fine sand	Moderate: Loany fine sand	Moderate: Loamy fine sand.
Metz loamy sand, 2 to 8 percent slopes.	Moderate: Loamy sand	Moderate: Loamy sand	Moderate: Loamy sand.
Metz loamy sand, channeled, 0 to 15 percent slopes.	Severe: Flooded	Severe: Flooded	Severe: Flooded.
Metz gravelly sandy loam, 2 to 15 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 2 to 15 percent.
Monserate sandy loam, 5 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Moderately deep	Moderate: Slopes 5 to 8 percent.
Monserate sandy loam, 0 to 5 percent slopes.	Moderate: Moderately deep	Moderate: Moderately deep	Slight.
Monserate sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Monserate sandy loam, 15 to 25 percent slopes, severely eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Monserate sandy loam, shallow, 5 to 15 percent slopes, eroded.	Severe: Shallow to hardpan	Severe: Shallow to hardpan	Moderate: Slopes 5 to 15 percent.
Monserate sandy loam, shallow, 15 to 25 percent slopes, severely eroded.	Severe: Shallow to hardpan	Severe: Shallow to hardpan	Severe: Slopes more than 15 percent.
Mottsville loamy sand, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Loamy sand	Moderate: Loamy sand.
Mottsville loamy sand, 8 to 15 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Loamy sand.
Mottsville cobbly loamy sand, 8 to 25 percent slopes.	Severe: Flooded	Severe: Flooded	Severe: Flooded.
Mottsville sandy loam, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Slopes 2 to 8 percent.	Moderate: Slopes 2 to 8 percent.
Mottsville sandy loam, 8 to 15 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Mottsville cobbly sandy loam, 8 to 25 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Murrieta stony clay loam, 2 to 25 percent slopes.	Severe: Slow permeability	Severe: Slow permeability	Severe: Slopes more than 15 percent.
Oak Glen fine sandy loam, 5 to 15 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 5 to 15 percent.
Oak Glen gravelly sandy loam, 8 to 15 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Oak Glen gravelly sandy loam, 15 to 25 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Pachappa fine sandy loam, 2 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Slopes 2 to 8 percent.	Moderate: Slopes 2 to 8 percent.
Pachappa fine sandy loam, 0 to 2 percent slopes.	Slight	Slight	Slight.
Perkins gravelly loam, 5 to 8 percent slopes.	Severe: Slow permeability	Severe: Slow permeability	Moderate: Slopes 5 to 8 percent.
Perkins gravelly loam, 2 to 5 percent slopes.	Severe: Slow permeability	Severe: Slow permeability	Slight.
Perkins loam, 2 to 8 percent slopes.	Severe: Slow permeability	Severe: Slow permeability	Moderate: Slopes 2 to 8 percent.
Perkins gravelly loam, 8 to 15 percent slopes, eroded.	Severe: Slow permeability	Severe: Slow permeability	Moderate: Slopes 8 to 15 percent.
Placentia fine sandy loam, 0 to 5 percent slopes.	Severe: Very slow permeability.	Severe: Very slow permeability.	Slight.
Placentia fine sandy loam, 5 to 15 percent slopes.	Severe: Very slow permeability.	Severe: Very slow permeability.	Moderate: Slopes 5 to 15 percent.
Placentia cobbly fine sandy loam, 8 to 25 percent slopes.	Severe: Very slow permeability.	Severe: Very slow permeability.	Moderate: Cobbly.
Porterville cobbly clay, 2 to 15 percent slopes.	Severe: Cobbly clay	Severe: Cobbly clay	Severe: Cobbly clay.
Porterville clay, 0 to 8 percent slopes.	Severe: Clay	Severe: Clay	Severe: Clay.
Porterville clay, moderately deep, 2 to 8 percent slopes.	Severe: Clay	Severe: Clay	Severe: Clay.
Porterville clay, moderately deep, slightly saline-alkali, 0 to 5 percent slopes.	Severe: Clay	Severe: Clay	Severe: Clay.
Porterville gravelly clay, moderately deep, 2 to 15 percent slopes, eroded.	Severe: Gravelly clay	Severe: Gravelly clay	Severe: Gravelly clay.

Table 7.—*Soil interpretations for recreational uses—Continued*

Soil name	Recreational uses		
	Play areas	Camp areas	Picnic areas
Ramona sandy loam, 2 to 5 percent slopes, eroded.	Moderate: Moderately slow permeability.	Moderate: Moderately slow permeability.	Slight.
Ramona sandy loam, 0 to 2 percent slopes.	Moderate: Moderately slow permeability.	Moderate: Moderately slow permeability.	Slight.
Ramona sandy loam, 0 to 5 percent slopes, severely eroded.	Moderate: Moderately slow permeability.	Moderate: Moderately slow permeability.	Slight.
Ramona sandy loam, 5 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Moderately slow permeability.	Moderate: Slopes 5 to 8 percent.
Ramona sandy loam, 5 to 8 percent slopes, severely eroded.	Severe: Slopes more than 5 percent.	Moderate: Moderately slow permeability.	Moderate: Slopes 5 to 8 percent.
Ramona sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Ramona sandy loam, 8 to 15 percent slopes, severely eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Ramona sandy loam, 15 to 25 percent slopes, severely eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Ramona sandy loam, moderately deep, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Ramona sandy loam, moderately deep, 15 to 25 percent slopes, severely eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Ramona very fine sandy loam, 0 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Moderately slow permeability.	Moderate: Slopes 0 to 8 percent.
Ramona very fine sandy loam, moderately deep, 0 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Moderately slow permeability.	Moderate: Slopes 0 to 8 percent.
Ramona and Buren loams, 5 to 15 percent slopes, eroded:			
Ramona part	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 5 to 15 percent.
Buren part	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 5 to 15 percent.
Ramona and Buren loams, 5 to 25 percent slopes, severely eroded:			
Ramona part	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Buren part	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Ramona and Buren sandy loams, 15 to 25 percent slopes, severely eroded:			
Ramona part	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Buren part	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Riverwash	Severe: Flooded	Severe: Flooded	Severe: Flooded.
Rock land	Severe: Very shallow to rock.	Severe: Very shallow to rock.	Severe: Very shallow to rock.
Rough broken land	Severe: Very shallow to rock.	Severe: Very shallow to rock.	Severe: Very shallow to rock.
San Emigdio fine sandy loam, 2 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Dust problem	Moderate: Dust problem.
San Emigdio fine sandy loam, 0 to 2 percent slopes.	Moderate: Dust problem	Moderate: Dust problem	Moderate: Dust problem.
San Emigdio fine sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Dust problem.
San Emigdio fine sandy loam, deep, 0 to 2 percent slopes.	Moderate: Dust problem	Moderate: Dust problem	Moderate: Dust problem.
San Emigdio loam, 0 to 2 percent slopes.	Slight	Slight	Slight.
San Emigdio loam, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Slopes 2 to 8 percent.	Moderate: Slopes 2 to 8 percent.
San Emigdio loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
San Emigdio sandy loam, channeled, 2 to 15 percent slopes.	Severe: Flooded	Severe: Flooded	Severe: Flooded.
San Timoteo loam, 8 to 25 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
San Timoteo loam, 25 to 50 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Sheephead rocky fine sandy loam, 15 to 75 percent slopes, eroded.	Severe: Shallow to rock; rocky.	Severe: Shallow to rock; rocky.	Severe: Slopes more than 15 percent.

Table 7.—*Soil interpretations for recreational uses—Continued*

Soil name	Recreational uses		
	Play areas	Camp areas	Picnic areas
Sheephead fine sandy loam, 8 to 15 percent slopes, eroded.	Severe: Shallow to rock	Severe: Shallow to rock	Moderate: Slopes 8 to 15 percent.
Soboba stony loamy sand, 2 to 15 percent slopes.	Severe: Flooded	Severe: Flooded	Severe: Flooded.
Soboba cobbly loamy sand, 2 to 25 percent slopes.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Soper loam, 15 to 35 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Soper cobbly loam, 25 to 50 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Temescal rocky loam, 15 to 50 percent slopes, eroded.	Severe: Shallow to rock; rocky.	Severe: Shallow to rock; rocky.	Severe: Slopes more than 15 percent.
Temescal loam, 15 to 50 percent slopes, eroded.	Severe: Shallow to rock	Severe: Shallow to rock	Severe: Slopes more than 15 percent.
Terrace escarpments	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Tollhouse rocky coarse sandy loam, 8 to 50 percent slopes, eroded.	Severe: Shallow to rock	Severe: Shallow to rock	Moderate: Slopes 5 to 15 percent.
Tollhouse sandy loam, 5 to 15 percent slopes, eroded.	Severe: Shallow to rock; rocky.	Severe: Shallow to rock; rocky.	Severe: Slopes more than 15 percent.
Tollhouse sandy loam, 15 to 25 percent slopes, eroded.	Severe: Shallow to rock	Severe: Shallow to rock	Severe: Slopes more than 15 percent.
Traver loamy fine sand, saline-alkali, eroded.	Moderate: Loamy fine sand	Moderate: Loamy fine sand	Moderate: Loamy fine sand.
Traver loamy fine sand, eroded	Moderate: Loamy fine sand	Moderate: Loamy fine sand	Moderate: Loamy fine sand.
Traver fine sandy loam, saline-alkali.	Moderate: Dust problem	Moderate: Dust problem	Moderate: Dust problem.
Traver fine sandy loam, strongly saline-alkali, eroded.	Moderate: Dust problem	Moderate: Dust problem	Moderate: Dust problem.
Tujunga loamy sand, channeled, 0 to 8 percent slopes.	Severe: Flooded	Severe: Flooded	Severe: Flooded.
Tujunga loamy sand, 0 to 5 percent slopes.	Moderate: Loamy sand	Moderate: Loamy sand	Moderate: Loamy sand.
Tujunga gravelly loamy sand, 0 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Gravelly loamy sand.	Moderate: Gravelly loamy sand.
Vallecitos loam, 8 to 25 percent slopes, severely eroded.	Severe: Shallow to rock	Severe: Shallow to rock	Severe: Slopes more than 15 percent.
Vallecitos rocky loam, 8 to 50 percent slopes, eroded.	Severe: Shallow to rock; rocky.	Severe: Shallow to rock; rocky.	Severe: Slopes more than 15 percent.
Vallecitos loam, thick solum variant, 2 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Moderately slow permeability.	Moderate: Slopes 2 to 8 percent.
Vallecitos loam, thick solum variant, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Vallecitos loam, thick solum variant, 15 to 50 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Visalia sandy loam, 0 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Slopes 0 to 8 percent.	Moderate: Slopes 0 to 8 percent.
Visalia fine sandy loam, 0 to 2 percent slopes.	Moderate: Dust problem	Moderate: Dust problem	Moderate: Dust problem.
Visalia fine sandy loam, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Dust problem	Moderate: Dust problem.
Vista coarse sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Vista coarse sandy loam, 2 to 8 percent slopes.	Severe: Slopes more than 5 percent.	Moderate: Moderately deep.	Moderate: Slopes 2 to 8 percent.
Vista coarse sandy loam, 15 to 35 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Vista rocky coarse sandy loam, 2 to 35 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Waukena fine sandy loam, saline-alkali.	Severe: Slow permeability	Severe: Slow permeability	Moderate: Dust problem.
Waukena fine sandy loam, strongly saline-alkali.	Severe: Slow permeability	Severe: Slow permeability	Moderate: Dust problem.
Waukena loam, saline-alkali	Severe: Slow permeability	Severe: Slow permeability	Moderate: Dust problem.
Waukena loamy fine sand, saline-alkali.	Moderate: Moderately slow permeability.	Moderate: Moderately slow permeability.	Moderate: Loamy fine sand.
Wet alluvial land	Severe: Poorly drained	Severe: Poorly drained	Severe: Poorly drained.
Willows silty clay, saline-alkali	Severe: Silty clay	Severe: Silty clay	Severe: Silty clay.
Willows silty clay	Severe: Silty clay	Severe: Silty clay	Severe: Silty clay.

Table 7.—*Soil interpretations for recreational uses—Continued*

Soil name	Recreational uses		
	Play areas	Camp areas	Picnic areas
Willows silty clay, strongly saline-alkali.	Severe: Silty clay	Severe: Silty clay	Severe: Silty clay.
Willows silty clay, deep, saline-alkali.	Severe: Silty clay	Severe: Silty clay	Severe: Silty clay.
Willows silty clay, deep, strongly saline-alkali.	Severe: Silty clay	Severe: Silty clay	Severe: Silty clay.
Wyman loam, 2 to 8 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Moderate: Moderately slow permeability.	Moderate: Slopes 2 to 8 percent.
Wyman fine sandy loam, 8 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 8 to 15 percent.
Yokohl loam, 2 to 8 percent slopes.	Severe: Slow permeability	Severe: Slow permeability	Moderate: Slopes 2 to 8 percent.
Yokohl loam, 8 to 15 percent slopes, eroded.	Severe: Slow permeability	Severe: Slow permeability	Moderate: Slopes 8 to 15 percent.
Yokohl loam, 8 to 25 percent slopes, severely eroded.	Severe: Slow permeability	Severe: Slow permeability	Severe: Slopes more than 15 percent.
Yokohl cobbly loam, 2 to 25 percent slopes, eroded.	Severe: Slow permeability	Severe: Slow permeability	Severe: Slopes more than 15 percent.
Ysidora gravelly very fine sandy loam, 2 to 8 percent slopes, eroded.	Moderate: Moderately deep	Moderate: Moderately deep	Moderate: Slopes 2 to 8 percent.
Ysidora gravelly very fine sandy loam, 8 to 25 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Ysidora gravelly very fine sandy loam, 8 to 25 percent slopes, severely eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Severe: Slopes more than 15 percent.
Ysidora very fine sandy loam, 2 to 15 percent slopes, eroded.	Severe: Slopes more than 5 percent.	Severe: Slopes more than 8 percent.	Moderate: Slopes 2 to 15 percent.

Formation, Morphology, and Classification of Soils

In this section the factors that affect the formation of the soils in the Western Riverside Area are discussed and important processes in the morphology of the soil are described. Then the classification of the soils by higher categories is given.

Formation of Soils

Soil is a natural body on the surface of the earth in which plants grow; it is composed of organic and mineral material. Soils differ in their appearance, composition, productivity, and management requirements in different localities or even within short distances in the same locality. The factors that cause soils to differ are: (1) the physical and chemical composition of the parent material; (2) the climate under which the soil material has accumulated and existed since accumulation; (3) the biological forces; (4) the relief, or lay of the land, and (5) the length of time the forces of formation have acted on the soil material. The relative importance of each factor differs from place to place, but generally the interaction of all the factors determines the kind of soil that forms in any given place.

Generally, the changes in soils take place gradually over a fairly long time. Newly added material tends to make up for losses of material, and in many areas a balance between the two develops. Over a long period, therefore, net changes in the soil under natural conditions may be only minor.

The influences of each soil-forming factor on the soils in the Western Riverside Area are summarized in the pages that follow.

Parent material

Parent material is the weathered rock or unconsolidated mass from which soils form. It is largely responsible for the chemical and mineralogical composition of soils. In the Western Riverside Area, the soils formed about equally in residuum and in alluvium.

The soils that formed in residuum formed in material weathered from sedimentary, metasedimentary, igneous, metamorphic-igneous, and metaigneous rocks. The gently rolling to very steep soils are shallow or very shallow and rocks crop out in many places. Examples are soils of the Cieneba, Friant, Gaviota, Lodo, Temescal, and Tollhouse series. The more gently sloping soils are moderately deep and rocks crop out in only a few places. These soils generally are slightly to moderately developed. The Cajalco, Crafton, Crouch, Escondido, Fallbrook, Las Posas, and Vista soils are examples.

The soils that formed in alluvium are weakly developed to strongly developed. Those that are weakly developed generally occupy areas that are flooded frequently. They continually receive fresh deposits of material through erosion and deposition. Braided stream channels traverse many of the steep alluvial fans where the stream enters a broad plain. Examples of weakly developed soils are the Cortina, Metz, and Tujunga. The somewhat more developed soils occupy areas along streams that are only slightly dissected. They receive fresh deposits of material through flooding and stream bank erosion. The Hanford,

Honcut, Garretson, and San Emigdio soils are examples of such soils. The moderately developed and strongly developed soils generally occupy the more stable recent alluvial areas, fanglomerates, and old nonmarine terraces of Pleistocene time. Examples are the Arbuckle, Placentia, Perkins, and Ramona soils.

The soils on the older terraces, such as Placentia and Ramona, generally are moderately eroded to severely eroded, especially the moderately sloping to moderately steep soils that have been cropped.

The most strongly developed soils are at elevations between 600 and 2,500 feet and west and southwest of the San Timoteo Badlands, where the annual rainfall is less than 15 inches. Most of the soils that have a duripan occur here. They are in the San Jacinto Basin; north and south of the Santa Ana River; east and west of the Elsinore-Temecula Trough; on the Pauba Mesa; and in many small areas of older alluvium within areas of upland soils. Such soils as the Arlington, Buren, Exeter, Monserate, and Ysidora that have a duripan developed on the same geologic formations as such moderately developed to strongly developed soils as the Greenfield, Placentia, and Ramona.

In many deep road cuts in old terraces, a sequence of duripans can be observed, one on top of the other, separated by layers of soil material. This suggests that during a period of Mediterranean climate when rainfall was fairly low, soluble silica was washed into the soil, dried, and formed the duripan. Then during a period of more active erosion and deposition, soil material was laid down on the landform at a much faster rate. This halted silica cementation in the original horizon and started cementation further up in the profile when the rate of deposition became more normal and rainfall was sufficient.

Climate

Climate has a strong influence on soil formation. Heat and moisture greatly influence the kind of vegetation that grows and the rate at which organic matter decomposes, and at which minerals weather. They also influence the removal of material from the soil horizons or the accumulation of material in them.

More organic matter accumulates in soils at elevations of more than 3,500 feet where the climate is cool and moist than at lower elevations. The cool temperature and short growing season slow growth of plants. The plants provide a large amount of organic matter to the soils, however, because their roots generally are coarse and the cool temperature slows decomposition.

Rainfall is greater at intermediate elevations than at lower elevations, but temperatures are cooler. At intermediate elevations the soils have a moderate content of organic matter. Vegetation is abundant, roots of the plants are fairly coarse, much residue is returned to the soil, and decomposition is rapid.

At low elevations the content of organic matter in the soils is low. The vegetation consists of annual grasses and forbs, which have very fine roots. The warm, moist weather in spring and late in fall results in rapid decomposition, though the soils are mainly dry in summer and early in fall. The content of organic matter is highest where the vegetation is mainly shrubs that have coarse roots.

In the lower elevations of the Area leaching of carbonates and soluble salts is insufficient to remove enough salts and alkali to permit growth of many plants. Annual precipitation ranges from 8 to 20 inches, and 75 to 90 percent of this precipitation occurs from November through April. In these months rainfall exceeds losses of moisture by transpiration and evaporation. Surplus water above transpiration and storage in the soil ranges from none to as much as 10 inches during the wettest season. The water is retained by the soil, percolates through it, or is lost through runoff. At low elevations not enough precipitation falls to leach the soils to a depth of 5 feet.

At high elevations, leaching is deeper. Evidence of this leaching is indicated by the absence of lime in all soils except those derived from dolomite and the Anza and Bishop soils. The presence of clay films at a considerable depth in many of the soils or within weathered rock, and acid reaction of the soils where precipitation is high are other evidences of leaching.

The effects of changes in climate on soils formed from similar parent material are evident in the soils of the Cieneba, Crouch, Tollhouse, and Vista series. All of these soils formed in material weathered from granodiorite. In the Cieneba and Vista soils, the content of organic matter is less than 1 percent and the pH is 6.0 to 7.0. In the Crouch and Tollhouse soils, however, the content of organic matter is greater than 1 percent and the pH is 6.0 or less.

Biological forces

In the Western Riverside Area, vegetation is dominant among the biological forces that affect formation of the soils. Plants, ground squirrels and other small animals, insects, bacteria, and other organisms add organic matter to the soils. Their activity, however, in the cycle of transferring and returning nutrients to the surface soil depends chiefly upon the vegetation that grows on the soils.

The major original plant communities in the survey area that influenced soil formation consisted of open grassland, or of woodland and grass, or of Coastal sagebrush, chaparral, and chamise chaparral.

The original grassland consisted mostly of bunchgrass, which covered the broad valleys, mountain ridges, and slopes of the Area. Most of the grassland was cultivated by 1940. The original grasses were replaced mostly by introduced annual grasses and forbs from the Mediterranean region of Europe and Asia. They were planted on the Arbuckle, Arlington, Buren, Exeter, Fallbrook, Greenfield, Placentia, Ramona, and San Emigdio soils. In areas where the water table was high the grassland consisted of various kinds of rhizotomous grasses, sedges, rushes, and other meadow plants. In areas where the soils were alkaline, such as the Grangeville and Traver near Elsinore, saltgrass and other alkaline-tolerant plants predominated.

The woodland and grass plant community is similar to the grassland plant community but includes trees. The stands consist of scattered oaks and grasses and of moderately dense stands of oaks and grasses. Examples of soils formed under woodland and grass are those of the Mottsville and Oak Glen series.

The Coastal sagebrush plant community consists of open stands of low brush that merge into grassland and chaparral communities at lower elevations. These plants

grow on such shallow soils as the Cieneba, Lodo, and Temescal.

The chaparral plant community consists of moderately dense to dense stands of evergreen, broadleaf shrubs. At higher elevations these plants grow on moderately deep to deep relatively fertile soils, such as those of the Crouch, Mottsville, and Oak Glen series. At elevations below 2,000 feet the chaparral plant community occupies north slopes where the temperature and supply of moisture are favorable.

The chamise or narrowleaf chaparral stands are dominated by chamise (*adenestoma fasciculatum*). These plants grow on shallow or eroded soils and on hot south-facing slopes at lower elevations of soils of the Badlands and of the Cieneba and San Timoteo series. On deep soils or on northern exposures at higher elevations, these plants generally replace chaparral or other plant communities destroyed by fire or erosion.

Relief

Relief influences the formation of soils through its effect on drainage, erosion, temperature, and plant cover. It is largely determined by the underlying geologic formation and the effects of dissection by rivers and streams.

Much differential elevation and subsidence along the geologic faults of the Area have taken place since the Pleistocene epoch. This fact is brought out by several hanging remnants of the Monserate soils at varying elevations. Monserate soils have formed over crystalline rock near the eastern boundary of the Indian Creek area at elevations of more than 2,500 feet. Areas of these soils also occur across from the San Jacinto Fault 2½ miles south of Valle Vista at an elevation of 2,000 feet. Other areas of Monserate soils are on the sides of steep rocky hills southeast of Lakeview isolated from any alluvium and about 400 to 500 feet above the same kind of soils near Homeland and in the Coyote Pass area. In addition Monserate soils are north of Catt Road at elevations of 1,300 to 1,500 feet, and in the Elsinore-Temecula Trough at elevations of 1,200 feet and less.

Time

Generally the age of a soil is related to the degree of development or degree of horizon differentiation within the soil. For this reason, a soil that has little or no development is considered young, and one that is strongly developed is considered old or mature. The age of any one soil is directly dependent on the action and interaction of the soil-forming factors.

The age of the soils is not necessarily related to the geologic age of the parent rock or alluvium. More than half of the soils in the survey area have little or no profile development. Old alluvium and some of the oldest rock formations in the survey area are the parent material of such soils. Examples are the Cieneba and Vista soils that formed in material weathered from granodiorite and the Hanford and Delhi soils that formed on alluvium. The Crafton and Sheephead soils which are somewhat more developed, however, formed in material from pre-Cenozoic granitic and metamorphic rock. On the other hand, some of the youngest rock in the survey area is Pleistocene basalt. The rock is the parent material of the Murrieta soils, one of the most strongly developed soils in the survey area. Slightly more than one-fourth of the soils in the survey area are moderately to strongly developed, and these include all soils that have a duripan. Examples are the Bonsall, Bull Trail, Buren, Fallbrook, Monserate, Murrieta, Placentia, and Ramona soils. The Placentia soils are the most strongly developed of the soils formed on alluvium. They formed in old nonmarine alluvium of Quaternary time.

Morphology of Soils

Many different kinds of soils have formed in the Western Riverside Area. Some of the soils have only faint horizons, or one of two horizons, and others have many distinct horizons. The differentiation of horizons in soils in this Area is the result of one or more of the following processes: (1) Weathering of parent materials, (2) accumulation of organic matter, (3) formation and translocation of clays, and (4) solution of silica and its reprecipitation as opal in duripans.

Some of the distinguishing features of the soils formed from bedrock are related to the degree of weathering of the parent rock. For example, where weathering has been slight, the soils have few horizons. The soils of the Cieneba and Temescal series formed in material that is slightly weathered. They have few horizons, and their color and texture are related to the underlying granodiorite and quartz latite-porphyry, respectively. As weathering increases, horizon differences are less directly related to the parent material but are products of alteration. Examples are the moderately deep Fallbrook soils. These soils have a reddish-brown sandy clay loam B2t horizon, and their horizons contrast strongly with the underlying brownish-yellow tonalite.

In most soils of the Area enough organic matter has accumulated on the surface to form an A1 horizon. The A1 horizon ranges from thin, faint, and pale in color, to thick, conspicuous, and dark in color. At the lowest elevations where warm temperature prevails, the A1 horizon is about 4 to 8 inches thick and is less than 1 percent organic matter. At the higher elevations where cooler temperatures prevail, the A horizon is 1 to 3 percent organic matter in the upper 6 to 15 inches. Examples are the Crouch soils, which have a thick dark A horizon.

The formation and translocation of clay varies with the degree of leaching. Differences in clay content between the A and Bt horizons range from slight to more than 20 percent. The Placentia soils, for example, have 20 percent more clay in the B2t horizon than in the A1 horizon.

The well-drained soils that have a higher clay content in the Bt horizon normally are brown to reddish brown, but they are red in places. The soluble silica moves downward in the soil. Periodic wetting and drying deposits the silica as opal at certain depths, and the opal accumulates and finally forms a duripan. The degree of cementation is indicated by the percent of opal covering the duripan. The extent of cementation ranges from the tips of sand grains cemented together to a solidly cemented opal covering that ranges from ½ inch to 6 inches in thickness.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their rela-

tionships to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

Thus, in classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and applied in managing farms and fields; in developing rural areas; in engineering work; and in many other ways. They are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*2*) and later revised (*10*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965 (*13*). The current system is under continual study. Therefore, readers interested in developments of this system should search the latest literature available (*5*, *7*, *8*). The soil series of the Western Riverside Area are placed in some categories of the current system in table 8. The classes in the current system are briefly defined in the paragraphs that follow.

ORDERS: Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate the soil orders are those that tend to give broad climatic groupings of soils. The exceptions, Entisols and Histosols, occur in many different climates. Six soil orders are represented in the Western Riverside Area—Alfisols, Aridisols, Entisols, Inceptisols, Mollisols, and Vertisols.

Alfisols are soils containing a clay-enriched B horizon that has medium or high base saturation.

Aridisols are soils in dry areas. They have a surface soil that is pale in color and generally is soft when dry or that has distinct structure.

Entisols are young mineral soils that do not have genetic horizons or have only the beginning of such horizons.

Inceptisols are mineral soils in which horizons have definitely started to develop. They generally are on young, but not recent, land surfaces.

Mollisols have formed mostly under grass. They have a thick, friable, dark-colored surface layer. Base saturation is more than 50 percent.

Vertisols are clayey soils that crack, shrink, and swell in all seasons and that have wide, deep cracks during dry periods.

SUBORDERS: Each order is subdivided into suborders, primarily on the basis of soil characteristics that seem to produce classes having the greatest genetic similarity. The suborders have a narrower climatic range than the orders. The criteria for suborders chiefly reflect the presence or absence of waterlogging or soil differences resulting from the climate or vegetation.

GREAT GROUPS: Each suborder is divided into great groups according to the presence or absence of genetic horizons and the arrangement of these horizons.

SUBGROUPS: Each great group is subdivided into subgroups. One of these subgroups represents the central (typic) segment of the great group, and the others, called intergrades, contain those soils having properties of soils in another group, suborder, or order.

FAMILIES: Each subgroup is divided into families, primarily on the basis of properties important to the growth of plants. Among the properties considered are texture, mineralogy, reaction, soil temperature, and thickness of horizons.

SERIES: The series consists of a group of soils that formed from a particular kind of parent material and having genetic horizons that, except for texture of the surface soils, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, consistence, reaction, and mineralogical and chemical composition.

New soil series must be established and concepts of some established series, especially older ones that have been used little in recent years, must be revised in the course of the soil survey program across the country. A proposed new series has tentative status until review of the series concept at the State, regional, and national levels of responsibility for soil classification results in a judgment that the new series should be established. Most of the soil series described in this publication have been established earlier.

Laboratory Analyses

In this section the results of the physical and chemical analyses of representative non saline-alkali soils and of representative saline-alkali soils are given in tables 9 and 10. Except for the Escondido, Friant, and Greenfield soils, the data are based on the profile described for the representative soils in the section "Descriptions of the Soils." The data for the Escondido, Friant, and Greenfield soils, though not based on the representative profile, represent the chemical and physical properties of these series. Each series was sampled at two places, but the results were similar, and data therefore are given for only one sample.

The soil samples were air dried, crushed with a rubber-tipped pestle, and then screened through a 2-millimeter, round-holed sieve. After they had been rubbed relatively clean, the coarse fragments larger than 2-millimeters in diameter were weighed to determine the percentage of gravel and were then discarded. The material that passed through the sieve was throughly mixed, and subsamples of this were used for the laboratory analyses. Methods used in obtaining the data are described in the paragraphs that follow. Unless otherwise stated, the methods used apply to both table 9 and table 10. All results are expressed on an ovendry basis.

Size class and diameter of particles.—Separation of particles into size classes and ranges of diameters for particle-size distribution data were made by pipette and sieve analyses. After treatment of the sample to remove organic matter and soluble salts, particles were dispersed with sodium hexametaphosphate and mechanical shaking (*12*, *14*).

Bulk density.—Bulk density, expressed in grams per cubic centimeter, was determined on core samples of the size of 4.7 by 3.5 centimeters. The samples were taken with the Salinity Laboratory modified Uhland core sampler (*12*). The bulk density is presumed to be equal to the horizon density at field moisture.

Moisture retention.—Moisture retained at a tension of 15 atmospheres was determined by using the pressure

TABLE 8.—*Soil series classified according to the current system of classification*[1]

Series	Family	Subgroup	Order
Altamont	Fine, montmorillonitic, thermic	Typic Chromoxererts	Vertisols.
Anza	Coarse-loamy, mixed, mesic	Pachic Haploxerolls	Mollisols.
Arbuckle	Fine-loamy, mixed, thermic	Typic Haploxeralfs	Alfisols.
Arlington	Coarse-loamy, mixed, thermic	Haplic Durixeralfs	Alfisols.
Auld	Fine, montmorillonitic, thermic	Typic Chromoxererts	Vertisols.
Bishop	Fine-loamy, mixed, calcareous, mesic	Cumulic Haplaquolls	Mollisols.
Bonsall	Fine, montmorillonitic, thermic	Haplic Natrixeralfs	Alfisols.
Bosanko	Fine, montmorillonitic, thermic	Chromic Pelloxererts	Vertisols.
Buchenau	Fine-loamy, mixed, thermic	Typic Durixeralfs	Alfisols.
Bull Trail	Fine-loamy, mixed, mesic	Mollic Haploxeralfs	Alfisols.
Buren	Fine-loamy, mixed, thermic	Haplic Durixeralfs	Alfisols.
Cajalco	Fine-loamy, mixed, thermic	Mollic Haploxeralfs	Alfisols.
Calpine	Coarse-loamy, mixed, mesic	Aridic Haploxerolls	Mollisols.
Chino	Fine-loamy, mixed, thermic	Aquic Haploxerolls	Mollisols.
Cieneba	Loamy, mixed, nonacid, thermic, shallow	Typic Xerorthents	Entisols.
Cortina	Loamy-skeletal, mixed, nonacid, thermic	Typic Xerofluvents	Entisols.
Crafton	Coarse-loamy, mixed, mesic	Entic Haploxerolls	Mollisols.
Crouch	Coarse-loamy, mixed, mesic	Ultic Haploxerolls	Mollisols.
Delhi	Mixed, thermic	Typic Xeropsamments	Entisols.
Dello	Mixed, thermic	Typic Psammaquents	Entisols.
Domino	Fine-loamy, mixed, thermic	Xerollic Calciorthids	Aridisols.
Escondido	Coarse-loamy, mixed, thermic	Typic Xerochrepts	Inceptisols.
Exeter	Fine-loamy, mixed, thermic	Typic Durixeralfs	Alfisols.
Fallbrook	Fine-loamy, mixed, thermic	Typic Haploxeralfs	Alfisols.
Friant	Loamy, mixed, thermic	Lithic Haploxerolls	Mollisols.
Garretson	Fine-loamy, mixed, nonacid, thermic	Typic Xerorthents	Entisols.
Gaviota	Loamy, mixed, nonacid, thermic	Lithic Xerorthents	Entisols.
Gorgonio	Sandy, mixed, thermic	Pachic Haploxerolls	Mollisols.
Grangeville	Coarse-loamy, mixed, thermic	Aquic Haploxerolls	Mollisols.
Greenfield	Coarse-loamy, mixed, thermic	Typic Haploxeralfs	Alfisols.
Hanford	Coarse-loamy, mixed, nonacid, thermic	Typic Xerorthents	Entisols.
Hilmar	Sandy over loamy, mixed,calcareous, thermic	Aquic Xerorthents	Entisols.
Honcut	Coarse-loamy, mixed, nonacid, thermic	Typic Xerorthents	Entisols.
Las Posas	Fine, montmorillonitic, thermic	Typic Rhodoxeralfs	Alfisols.
Lodo	Loamy, mixed, thermic	Lithic Haploxerolls	Mollisols.
Madera	Fine, montmorillonitic, thermic	Typic Durixeralfs	Alfisols.
Metz	Sandy, mixed, thermic	Typic Xerorthents	Entisols.
Monserate	Fine-loamy, mixed, thermic	Typic Durixeralfs	Alfisols.
Mottsville	Sandy, mixed, mesic	Torriorthentic Haploxeralfs	Mollisols.
Murrieta	Clayey, montmorillonitic, thermic	Lithic Haploxeralfs	Alfisols.
Oak Glen	Coarse-loamy, mixed, mesic	Pachic Haploxerolls	Mollisols.
Pachappa	Fine-loamy, mixed, thermic	Mollic Haploxeralfs	Alfisols.
Perkins	Fine-loamy, mixed, thermic	Mollic Haploxeralfs	Alfisols.
Placentia	Fine, montmorillonitic, thermic	Haplic Natrixeralfs	Alfisols.
Porterville	Fine, montmorillonitic, thermic	Typic Chromoxererts	Vertisols.
Ramona	Fine-loamy, mixed, thermic	Typic Haploxeralfs	Alfisols.
San Emigdio	Coarse-loamy, mixed, calcareous, thermic	Typic Xerorthents	Entisols.
San Timoteo	Coarse-loamy, mixed, calcareous, thermic	Typic Xerorthents	Entisols.
Sheephead	Loamy, mixed, mesic, shallow	Ultic Haploxerolls	Mollisols.
Soboba	Sandy-skeletal, mixed, thermic	Typic Xerorthents	Entisols.
Soper	Fine-loamy, mixed, thermic	Aridic Argixerolls	Mollisols.
Temescal	Loamy, mixed, thermic	Lithic Xerochrepts	Inceptisols.
Tollhouse	Loamy, mixed, mesic, shallow	Entic Haploxerolls	Mollisols.
Traver	Coarse-loamy, mixed, thermic	Natric Haploxeralfs	Alfisols.
Tujunga	Mixed, thermic	Typic Xeropsamments	Entisols.
Vallecitos	Clayey, montmorillonitic, thermic	Ruptic-Entic Lithic Mollic Haploxeralfs.	Alfisols.
Vallecitos, thick solum variant	Fine, montmorillonitic, thermic	Mollic Palexeralfs	Alfisols.
Visalia	Coarse-loamy, mixed, thermic	Pachic Haploxerolls	Mollisols.
Vista	Coarse-loamy, mixed, thermic	Typic Xerochrepts	Inceptisols.
Waukena	Fine-loamy, mixed, thermic	Typic Natrixeralfs	Aridisols.
Willows	Fine, montmorillonitic, thermic	Typic Pelloxererts	Vertisols.
Wyman	Fine-loamy, mixed, thermic	Typic Haploxeralfs	Alfisols.
Yokohl	Fine, montmorillonitic, thermic	Typic Durixeralfs	Alfisols.
Ysidora	Fine-loamy, mixed, thermic	Haplic Durixeralfs	Alfisols.

[1] Placement of some soil series in the current system of classification, particularly in families, may change as more precise information becomes available.

membrane apparatus on the fragmented samples (*12*). Moisture retained at 15 atmospheres pressure corresponds fairly closely to the permanent wilting point.

Reaction.—Soil reaction, expressed in pH value, was obtained by glass electrode pH meter using a 1:10 soil-water ratio and a saturated paste (*6*, *12*).

Cation exchange capacity.—The cation exchange capacity was determined by saturating the samples with sodium by mixing the samples with a solution of sodium acetate. The amount of exchangeable sodium displaced by ammonium acetate extraction represents the cation exchange capacity. The exchangeable sodium was determined by flame analysis (*4*).

Extractable cations.—The extractable cations, calcium, magnesium, sodium, and potassium, were extracted with neutral, normal ammonium acetate. Calcium was precipitated as an oxalate and titrated (*6*), magnesium was determined gravimetrically as magnesium pyrophosphate (*14*), and sodium and potassium were analysed by flame photometer. Extractable acidity or exchangeable hydrogen was displaced from the soil with triethanolamine and barium chloride at pH 8.2 (*6*, *14*). The exchangeable form of sodium, instead of the extractable form is reported in tables 9 and 10. Exchangeable sodium as given is corrected data calculated by subtracting the amount of sodium in the saturation extract from the amount extracted with ammonium acetate.

Base saturation.—The percent base saturation (table 9) was determined by dividing the sum of the extractable bases by the cation-exchange capacity and multiplying the result by one hundred.

Electrical conductivity.—Electrical conductivity as an estimate of soluble salts in the saturation extract was measured by Wheatstone bridge. The conductivity is reported in milliohms per centimeter at the standard temperature of 25° C.

Exchangeable sodium percentage.—The exchangeable sodium percentage (table 10), or the degree of saturation of the exchange complex with sodium, is a value derived by dividing the exchangeable sodium by the cation exchange capacity (NaOAc) and multiplying the result by one hundred (*12*).

Ions in saturation extract.—The ions in the saturation extract, given in table 10 and expressed as milliequivalents per liter, were determined by analysing the water extracted from a saturated soil paste. The saturated paste was formed by adding water to the soil until the mixture would just begin to flow (*12*). The percentage of moisture at saturation represents a weight difference between the soil paste and the oven-dried subsample. The water of saturation was removed from the soil paste by vacuum filtration and the soluble ions were determined by the following procedures: calcium and magnesium by the versenate method; bicarbonate by titration with acid; chloride by titration with silver nitrate (*12*); and sodium by flame photometer.

Percent carbonate.—The percent carbonate, reported as equivalent to calcium carbonate was measured from the amount of carbon dioxide evolved on acidification of the soil sample (*12*, *14*).

Percent gypsum.—The percent of gypsum (table 10) was determined by precipitation with acetone (*12*).

Percent organic carbon.—The percent of organic carbon was determined by acid-dichromate digestion and ferrous sulfate titration, a modification of the Walkley-Black method (*6*).

General Nature of the Area

In this section the physiography, relief, and drainage of the Western Riverside Area are discussed. Then facts are given about the climate, water supply, and settlement and development.

Physiography, Relief, and Drainage

The Western Riverside Area is made up of interior valleys, mountains, and a number of small lakes and reservoirs. The Cleveland National Forest, the San Bernardino National Forest, and the Santa Ana Mountains border the Area. The San Jacinto Mountains, within the Area, are separated from the San Bernardino Mountains by the San Gorgonio Pass. The Coachella Valley extends in a southeastward direction to the Salton Sea, which is outside the survey area. The highest elevation of the pass is about 2,500 feet. The San Jacinto River Valley is as much as 30 miles wide, is smooth to undulating, and is mostly 1,500 to 2,000 feet in elevation. Prominent mountain peaks in the Area, and their elevation are: San Gorgonio, 11,485 fee, San Jacinto, 10,831 feet; Toro, 8,716 feet, and Santiago, 5,700 feet.

The Area is drained mainly by the Santa Ana River in the northwestern part, the San Jacinto River in the San Jacinto Basin, and the San Timoteo Creek north and west of Beaumont. The San Timoteo Creek flows northwestward into the Santa Ana River in San Bernardino County. The Santa Ana River enters the Area north of Riverside and flows southwestward into the Prado Basin. Temescal Wash enters the Santa Ana River at Prado Basin and exists in the northwestern corner of the survey area. It drains Temescal Canyon and takes the overflow from Lake Elsinore. The San Jacinto River empties into Lake Elsinore after all the water rights for Lake Hemet and Railroad Canyon Reservoirs have been satisfied.

The Temecula River drains the southern part of the Area from Anza west, and flows into the Santa Margarita River in the southwestern corner of the Area. The Santa Margarita River flows into the ocean. The San Gorgonio River drains the area north and east of Banning into the Whitewater River that flows to the Salton Sea outside of the Area. The small area south and west of Anza drains southeastward into Coyote Creek to Borrego Valley.

Climate

In the Western Riverside Area, summers are hot and dry and winters are cool and moist. From May to October the rainfall averages 0.7 inch at the lower elevations, at Hemet, and 2.2 inches at the 5,000-foot elevation, at Idyllwild. Precipitation increases from September to November and is greatest in December and January. It decreases rapidly in March and April. The lower elevations receive less than 10 percent of the precipitation during June to October. The higher elevations receive 15 to 20 percent during the same period.

TABLE 9.—*Physical and chemical analyses of representative*

[Analyses by Soil Survey

Soil name and sample number	Horizon	Depth	Size class and diameter of particles[1]							Gravel (2—76 mm.)[2]	Bulk density (cores)	Moisture held at 15 atmospheres[1]
			Silt (0.05—0.002 mm.)	Clay (less than 0.002 mm.)	Very coarse sand (2.0—1.0 mm.)	Coarse sand (1.0—0.5 mm.)	Medium sand (0.5—0.25 mm.)	Fine sand (0.25—0.10 mm.)	Very fine sand (0.10—0.05 mm.)			
		Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Gm./cc.*	*Percent*
Exeter sandy loam, 0 to 2 percent slopes; S57 Calif. 33—11 (1—7); (modal).	Ap	0—10	22.2	8.8	8.4	17.8	11.0	19.1	12.7	3	1.77	3.0
	A3	10—16	26.4	15.8	8.3	15.3	8.9	14.5	10.8	2	1.72	5.6
	B21t	16—25	29.1	19.2	9.2	12.9	7.2	12.3	10.1	2	1.65	6.8
	B22t	25—30	33.4	19.2	4.8	11.5	6.6	12.9	11.6	2	1.53	7.2
	B3ca	30—37	31.2	6.9	7.8	14.6	9.3	17.1	13.1	5	....	6.6
	C1sim	37—50	Indurated hardpan.	....	....	....	....	....	....	....	....	....
	C2ca	50—60	18.5	14.0	18.1	18.4	8.6	14.2	8.2	14	....	5.5
Escondido fine sandy loam, 8 to 15 percent slopes, eroded; S57 Calif. 33—3 (1—4); (somewhat shallow[6] for modal).	A11	0—2	41.8	17.3	3.3	6.9	5.6	13.8	11.3	35	....	6.6
	A12	2—8	45.3	19.9	1.3	5.5	4.6	12.2	11.2	13	....	6.8
	B21	8—13	46.0	20.7	1.5	4.3	4.3	11.6	11.6	13	....	7.1
	B22	13—19	46.2	22.2	2.4	5.4	4.0	10.0	9.8	24	....	8.1
Friant rocky fine sandy loam, 25 to 50 percent slopes, eroded; S55 Calif. 33—9 (1—3); ( ).). .	A11	0—2	20.9	6.2	5.5	8.8	8.3	30.8	19.5	5	....	5.5
	A12	2—9	20.5	7.6	3.9	8.6	8.5	31.0	19.9	10	....	4.5
	A13	9—13	17.2	15.4	3.8	9.8	9.2	27.5	17.1	16	....	7.8
Greenfield sandy loam, 8 to 15 percent slopes, eroded; S57 Calif. 33—16 (1—7); (somewhat more developed than modal).	Ap1	0—1	11.6	9.3	21.1	22.8	12.2	16.7	6.3	12	....	4.8
	Ap2	1—8	14.4	5.8	18.8	24.9	12.7	17.1	6.3	2	....	2.5
	A11	8—18	14.3	5.8	23.3	23.0	11.8	15.9	5.9	11	....	2.6
	A12	18—32	16.0	6.1	15.0	23.3	12.9	19.4	7.3	14	....	2.6
	B21t	32—41	13.8	13.9	18.7	21.0	11.4	15.4	5.8	16	....	5.4
	B22t	41—47	10.5	13.4	19.0	26.3	12.3	14.1	4.4	15	....	5.6
	C	47—64	7.7	12.0	16.9	30.0	13.5	15.3	4.6	17	....	4.8
Lodo rocky loam, 8 to 25 percent slopes, eroded; S57 Calif. 33—4 (1—2); (modal).	A11	0—3	43.5	8.0	5.4	9.1	5.7	14.4	13.9	38	....	5.1
	A12	3—8	41.8	10.6	4.0	8.4	6.0	15.0	14.2	40	....	4.9
Monserate sandy loam, 5 to 8 percent slopes, eroded; S57 Calif. 33—13 (1—7); (modal).	Ap	0—5	27.7	7.7	9.9	13.9	9.0	19.0	12.8	10	....	3.8
	A3	5—10	21.4	16.9	18.6	15.5	6.7	12.4	8.5	21	....	5.8
	B21t	10—20	18.1	30.8	9.2	13.1	6.7	14.3	7.8	22	....	10.2
	B22t	20—28	19.6	21.6	10.8	14.2	7.4	17.2	9.2	24	....	7.9
	C1m	28—45	Indurated hardpan.	....	....	....	....	....	....	....	....	....
	C2	45—57	9.6	5.1	22.7	25.7	10.5	19.2	7.2	29	....	3.8
	C3	57—70	8.3	5.0	77.0	4.9	1.8	2.4	.6	29	....	3.8
Placentia fine sandy loam, 0 to 5 percent slopes; S55 Calif. 33—15 (1—6); (modal).	A11	0—8	....	....	....	....	....	....	....	....	....	3.2
	A12	8—13	....	....	....	....	....	....	....	....	....	3.9
	A13	13—18	....	....	....	....	....	....	....	....	....	4.8
	B21t	18—31	....	....	....	....	....	....	....	....	....	12.5
	B22t	31—39	....	....	....	....	....	....	....	....	....	12.1
	B3	39—57	....	....	....	....	....	....	....	....	....	9.9

non saline-alkali soils of Western Riverside Area, California

Laboratory, Riverside, California]

Moisture at saturation	Reaction: Saturated paste	Reaction: In 1:10 soil water suspension	Cation exchange capacity (NaOAc)	Extractable cations (meq. per 100 grams of soil): Calcium	Magnesium	Hydrogen	Sodium[3]	Potassium	Base saturation, sum	Electrical conductivity (millimhos per cm. at 25° C.)	Carbonate as CaCO3	Organic carbon
Percent	*pH*	*pH*							*Percent*		*Percent*	*Percent*
19.8	5.1	5.7	5.7	4.7	1.2	2.1	0.3	0.5	76	4.8	...	0.39
24.1	6.4	6.5	10.8	7.7	2.5	2.8	.7	.3	80	5.3	...	.19
27.8	6.8	7.3	16.5	12.7	4.5	1.5	.8	.3	92	4.8	...	.16
29.1	7.0	7.2	18.2	13.6	5.2	1.3	.8	.2	94	5.0	...	.07
29.5	7.7	8.1	15.3	...	...	...	.5	.2	([4])	2.2	6	.04
...	7.8	8.2	...	...	...	...	...	...	...	...	([5])	...
23.6	7.8	7.8	10.0	...	...	...	.7	.2	([4])	1.3	([5])	.01
38.4	6.7	7.2	21.5	9.6	3.4	1.3	.5	.6	92	.9	...	1.84
30.7	6.8	6.7	30.9	13.8	4.9	1.5	.5	.2	93	.4	...	.28
30.7	6.5	7.4	29.3	14.7	4.9	.4	.6	.2	98	.4	...	.22
33.8	6.7	7.1	31.3	17.6	5.8	2.6	.7	.2	90	.4	...	.22
39.1	6.2	6.2	15.8	9.0	1.4	4.6	.2	.4	71	.4	...	2.14
29.9	6.7	6.7	11.5	6.6	1.2	2.0	.1	.3	80	.4	...	.71
32.1	6.6	6.6	12.4	4.4	1.5	2.1	.1	.5	75	.3	...	.29
36.1	6.5	7.2	9.7	7.6	1.8	2.4	.3	.6	81	2.3	...	1.95
21.9	6.4	6.8	5.2	3.1	1.0	2.0	.2	.4	70	.4	...	.55
19.3	5.8	6.4	5.4	2.5	.7	2.0	.5	.3	67	.2	...	.29
18.3	6.1	6.6	4.6	2.6	1.0	1.4	.4	.2	75	.1	...	.16
21.1	6.2	6.6	7.5	4.8	2.1	1.8	.4	.2	81	.3	...	.08
22.7	6.3	6.3	7.9	5.0	3.0	1.6	.4	.2	84	.3	...	.09
24.7	6.4	6.5	7.1	4.3	2.7	.7	.6	.1	92	.2	...	.05
32.2	6.4	6.3	12.4	7.5	2.3	2.0	.5	.7	85	.6	...	1.07
24.5	6.2	6.3	13.6	7.1	2.8	2.0	.5	.3	84	.4	...	.52
26.9	6.7	6.7	7.3	4.3	2.2	1.8	.3	.7	81	.8	...	.57
24.2	6.7	6.4	9.1	5.6	2.6	2.3	.3	.4	79	.4	...	.29
33.9	6.6	6.7	17.8	10.9	4.8	2.6	.5	.3	86	.2	...	.24
32.1	6.9	6.8	18.0	11.7	4.6	1.7	.7	.2	91	.5	...	.12
...	7.9	7.4	...	...	...	...	...	...	...	...	([5])	...
28.7	7.9	7.8	8.9	...	...	...	.5	.2	...	.3	([5])	.01
27.3	7.9	7.7	8.3	...	...	...	.6	.2	...	.4	([5])	.02
23.2	5.4	5.9	7.0	2.3	.9	2.7	.2	.2	57	.2	...	.38
23.3	5.1	5.7	7.9	3.0	3.9	3.0	.2	.2	71	.2	...	.27
21.4	6.1	6.8	9.9	4.6	2.3	2.3	.6	.1	77	.3	...	.14
39.9	7.2	8.2	19.5	8.3	6.7	2.1	2.1	.1	89	.9	...	.27
45.4	8.0	9.0	18.3	...	...	...	2.8	.1	...	2.0	2.0	.13
38.4	8.0	8.9	13.9	...	...	...	2.6	.1	...	3.4	([5])	.08

Table 9.—*Physical chemical analyses of representative*

Soil name and sample number	Horizon	Depth	Size class and diameter of particles[1]: Silt (0.05–0.002 mm.)	Clay (less than 0.002 mm.)	Very coarse sand (2.0–1.0 mm.)	Coarse sand (1.0–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.10 mm.)	Very fine sand (0.10–0.05 mm.)	Gravel (2–76 mm.)[2]	Bulk density (cores)	Moisture held at 15 atmospheres[1]
		Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Gm./cc.*	*Percent*
Ramona sandy loam, 2 to 5 percent slopes, eroded; S59 Calif. 33–1 (1–8); (modal).	Ap	0–14	...	...	...	...	...	...	...	...	...	4.4
	A1	14–23	...	...	...	...	...	...	...	...	...	6.2
	B1	23–29	...	...	...	...	...	...	...	...	...	6.8
	B21t	29–37	...	...	...	...	...	...	...	...	...	7.7
	B22t	37–46	...	...	...	...	...	...	...	...	...	9.8
	B23t	46–58	...	...	...	...	...	...	...	...	...	10.5
	B3	58–68	...	...	...	...	...	...	...	...	...	11.6
	C	68–74	...	...	...	...	...	...	...	...	...	11.4
San Emigdio fine sandy loam, 2 to 8 percent slopes, eroded; S55 Calif. 33–13 (1–4); (modal).	Ap	0–8	37.1	8.5	2.1	4.1	5.7	22.3	20.2	0	...	5.0
	C1	8–22	36.5	8.2	1.5	4.6	6.1	23.2	19.9	7	...	4.9
	C2	22–42	36.2	7.8	1.6	4.3	6.3	24.1	19.7	7	...	4.8
	C3	42–60	38.2	9.1	1.5	4.3	5.7	21.6	19.6	6	...	5.4
Vista coarse sandy loam, 8 to 15 percent slopes, eroded; S55 Calif. 33–7 (1–4); (modal).	A11	0–1	20.5	4.9	14.6	18.4	10.5	20.4	10.7	12	...	3.5
	A12	1–9	17.5	5.9	15.7	19.9	11.0	20.1	9.9	10	...	3.4
	A3	9–15	16.2	7.2	18.5	21.0	10.2	18.8	8.1	16	...	3.8
	B2	15–24	14.5	9.1	16.6	21.1	9.5	19.8	9.4	26	...	4.0

[1] Based on percent of less than 2 millimeters of soil.
[2] Based on total percent of soil.
[3] Exchangeable sodium (extractable sodium—sodium in saturation extract).

TABLE 10.—*Physical and chemical analyses of representative*

[Analyses by Soil Survey

Soil name and sample number	Horizon	Depth	Size class and diameter of particles[1]: Silt (0.05–0.002 mm.)	Clay (less than 0.002 mm.)	Very coarse sand (2.0–1.0 mm.)	Coarse sand (1.0–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.10 mm.)	Very fine sand (0.10–0.05 mm.)	Bulk density (cores)	Moisture held at tension of 15 atmospheres[1]	Moisture at saturation	Reaction: Saturated paste	In 1:10 soil water suspension
		Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Gm./cc.*	*Percent*	*Percent*	*pH*	*pH*
Traver loamy fine sand, saline-alkali, eroded; S57 Calif. 33–14 (1–7); (modal).	Ap	0–6	15.5	3.4	0.3	2.9	8.3	47.5	22.1	1.46	2.2	35.1	6.6	6.7
	A1	6–13	18.8	4.3	.2	1.9	6.1	44.5	24.2	1.49	2.1	30.9	6.4	6.8
	B21t	13–19	20.2	11.4	.1	1.0	4.1	39.5	23.7	1.71	5.7	35.8	8.2	8.5
	B22t	19–24	21.2	12.7	.1	.6	2.2	39.9	23.3	1.58	6.6	42.1	8.8	9.6
	B23t	24–38	23.6	12.8	.1	.6	2.5	36.1	24.3	1.58	6.6	45.5	9.0	9.8
	B3ca	38–53	37.6	16.1	.3	.6	1.3	22.2	21.9	1.61	9.6	54.5	9.0	9.8
	C	53–60	35.8	14.1	0	.4	1.0	21.1	27.6	1.62	8.0	52.9	8.9	9.8
Willows silty clay, saline-alkali; S57 Calif. 33–6 (1–6); (modal).	Ap	0–6	52.5	44.2	.2	.2	.2	.9	1.8	...	17.3	65.4	7.5	8.0
	A1	6–10	46.4	50.6	.2	.3	.2	.8	1.5	...	19.3	71.0	7.9	8.3
	AC	10–24	45.6	51.6	.1	.3	.2	.7	1.5	...	20.9	84.6	8.0	9.2
	C1	24–30	47.3	50.0	.1	.2	.2	.6	1.6	1.54	21.3	83.0	7.9	8.5
	C1cacs	30–42	47.8	49.0	.3	.3	.2	.7	1.7	1.49	21.5	84.1	7.8	8.0
	C2cacs	42–60	49.1	47.2	.1	.4	.2	.8	2.2	1.56	21.9	86.5	7.8	8.0

[1] Based on percentage of less than 2 millimeters of soil.

non saline-alkali soils of Western Riverside Area, California—Continued

Moisture at saturation	Reaction: Saturated paste	Reaction: In 1:10 soil water suspension	Cation exchange capacity (NaOAc)	Extractable cations (meq. per 100 grams of soil): Calcium	Magnesium	Hydrogen	Sodium[3]	Potassium	Base saturation, sum	Electrical conductivity (millimhos per cm. at 25° C.)	Carbonate as CaCO3	Organic carbon
Percent	*pH*	*pH*							*Percent*		*Percent*	*Percent*
21.7	5.9	6.6	8.7	4.0	1.2	2.4	.1	.5	71	1.1	....	.40
23.1	6.4	6.7	11.2	5.5	1.7	3.0	.1	.4	72	.3	....	.45
25.8	6.6	6.9	12.4	5.8	2.6	3.0	.1	.4	75	.4	....	.34
28.2	6.7	7.0	14.2	6.4	3.1	3.7	.1	.3	73	.3	....	.22
34.8	6.9	7.2	18.0	8.2	4.3	3.5	.2	.2	79	.2	....	.13
38.5	7.0	7.4	20.4	9.9	4.8	3.5	.2	.1	81	.2	....	.09
37.0	7.0	7.5	23.4	11.5	5.7	3.9	.3	.1	85	.2	....	.07
35.6	7.0	7.5	21.6	12.3	6.1	3.3	.3	.1	85	.2	....	.10
28.0	7.6	8.2	13.8	....	....	....	.2	.6	([4])	.8	<1	.61
26.2	7.8	8.9	14.7	....	....	....	.2	.3	([4])	.6	1	.24
26.2	8.0	9.0	14.7	....	....	....	.2	.2	([4])	.4	2	.16
26.6	8.0	8.9	16.3	....	....	....	.3	.2	([4])	.5	3	.12
31.5	6.4	6.4	10.3	6.1	.9	2.3	.2	.4	74	.4	....	1.09
27.8	6.2	6.3	9.3	5.3	1.0	2.3	.1	.3	74	.3	....	.65
24.7	6.7	6.2	7.5	4.3	1.2	1.0	.2	.3	86	.2	....	.20
24.9	6.9	6.8	8.5	4.9	1.5	.8	.1	.2	89	.2	....	.14

[4] Horizons calcareous; assumed 100 percent base saturation.
[5] Trace.
[6] Escondido fine sandy loam, 8 to 15 percent slopes, eroded, has more clay in the B horizon than Escondido soils mapped elsewhere in California.

saline-alkali soils of Western Riverside Area, California

Laboratory, Riverside, California]

Cation exchange capacity (NaOAc)	Extractable cations (meq. per 100 grams of soil): Calcium	Magnesium	Sodium[2]	Potassium	Exchangeable sodium (ESP)[3]	Ions in saturation extract (meq. per liter): Calcium	Magnesium	Sodium	Bicarbonate	Chloride	Electrical conductivity (millimhos per cm. at 25° C.)	Carbonate as CaCO3	Gypsum	Organic carbon
					Percent							*Percent*	*Percent*	*Percent*
5.0	2.6	0.7	0.5	0.7	10	1.1	0.4	2.8	2.8	1.6	0.5	0	0	0.67
5.4	2.4	.8	1.2	.5	22	.8	.3	6.2	1.1	3.6	.8	0	0	.29
8.5	2.9	2.3	3.6	.5	42	2.1	2.0	57.0	4.4	11.5	5.6	0	0	.14
10.9	....	....	6.7	.6	61	1.0	1.2	66.0	2.5	15.4	7.5	1	0	.08
10.3	....	....	7.0	.5	68	.4	.7	66.0	3.1	15.5	7.2	3	0	.05
16.2	....	....	13.4	1.2	83	.5	.9	90.0	2.5	21.3	9.5	5	0	.06
14.2	....	....	12.2	.9	86	.8	1.0	106.0	2.3	25.2	11.0	5	0	.01
38.1	....	....	3.8	1.7	10	23.1	6.6	28.8	5.0	27.4	5.6	3	0	.98
40.3	....	....	8.1	.7	20	8.1	4.6	52.0	4.6	57.6	7.0	5	0	.68
40.0	....	....	19.7	1.2	49	8.4	4.6	105.0	4.6	105.1	11.5	5	0	.60
41.1	....	....	19.4	1.1	47	41.1	13.6	173.0	3.1	155.5	15.1	5	0	.45
41.0	....	....	21.0	1.0	51	32.4	17.4	198.0	2.6	195.8	11.0	6	.4	.41
41.3	....	....	18.7	.9	45	44.5	16.3	216.0	2.6	204.0	23.3	6	1	.35

[2] Exchangeable sodium (extractable sodium—sodium in saturation extract).
[3] Exchangeable sodium percentage.

Climatically the Western Riverside Area is divided into two parts, Land Resource Area 19 and Land Resource Area 20. The locations of the land resource areas are shown on the General Soil Map at the back of this survey.

Land Resource Area 19 is at elevations of less than 3,500 feet. It has a Mediterranean climate. Annual precipation ranges from 9 to 18 inches, and the average annual temperature is 59° to 67° F.

Land Resource Area 20 is at elevations above 3,500 feet. It approaches a continental climate. Annual precipitation, including snow, ranges from 10 to 30 inches, and the average annual temperature is 50° to 59° F. The area southeast of Coahuila Mountain is in a rain shadow and has an annual precipitation of 9 to 13 inches.

Table 11 gives temperature and precipitation data recorded at the Riverside Fire Station and the Idyllwild Ranger Station. Temperature and precipitation in the Area vary according to elevation except for local differences caused by rain shadows and air drainage patterns.

TABLE 11.—*Temperature and precipitation data for two weather stations in the Western Riverside Area, Calif.*

Month	Temperature				Precipitation
	Average daily maximum	Average daily minimum	Record high	Record low	Average monthly total
	°F.	°F.	°F.	°F.	Inches
RIVERSIDE FIRE STATION					
January	65.3	37.3	88	19	1.97
February	67.0	39.2	88	24	2.29
March	71.2	41.4	95	25	1.75
April	75.1	45.8	100	30	.97
May	79.7	49.9	108	34	.22
June	86.0	53.1	106	39	.04
July	94.1	57.6	116	41	.06
August	93.6	57.4	112	42	.16
September	91.9	54.6	115	39	.09
October	82.8	48.6	107	31	.53
November	75.0	41.2	96	23	.83
December	67.9	38.7	94	21	2.13
Year	79.1	47.1	116	19	11.04
IDYLLWILD RANGER STATION					
January	52.7	24.7	80	4	3.99
February	53.7	25.4	79	4	3.74
March	65.3	28.7	77	11	3.68
April	64.5	32.0	91	12	1.75
May	69.2	36.3	96	21	.82
June	79.1	43.1	95	25	.08
July	85.8	51.5	101	32	.60
August	84.5	49.9	98	31	.88
September	81.4	45.4	96	27	.67
October	71.4	37.9	93	18	.90
November	61.6	30.7	81	10	2.21
December	56.3	27.3	82	10	3.60
Year	68.0	36.1	101	4	22.92

Water Supply

A shortage of water has existed in Western Riverside Area since the beginning of settlement in 1771. The first canal from the Santa Ana River to the higher terrace lands was constructed in 1871. By 1875, 1,500 acres had been planted, chiefly to grapes. The Washington navel orange was introduced to the Area in 1920 and this orange was planted as rapidly as water could be supplied to the groves from underground and surface sources. Because of the need for water several canals were constructed for the purpose of supplying water to the Area from San Bernardino County. Water from Bear Valley was transported to Sunnymead and Moreno, and water from Lake Hemet was transported to Hemet and Valle Vista.

Pumping the underground water basins lowered water level and increased the cost of irrigation. In the 1940's and 1950's the shortage of water available for irrigation became critical, and large areas were added to the Metropolitan Water District to obtain a supplemental water supply. This water supply supplemented the supply of irrigation and domestic water from the Colorado River Aqueduct.

The three main municipal districts serving the Area are: (1) The Eastern Municipal Utility District, which serves the San Jacinto Basin; (2) the Western Municipal Utility District, which serves the general area west of U.S. Highway 395 to Estelle Peak, Lake Mathews, and northwestward to the Santa Ana River, including the city of Riverside and the communities of La Sierra, Arlington, Rubidoux, and Highgrove; and (3) the Elsinore Valley Municipal Utility District, which serves the area around Lake Elsinore.

Water for irrigation is scarce, and it must be applied efficiently. In general, water for irrigation can be applied more evenly and efficiently on the sloping and hilly soils through sprinklers. Some of the nearly level soils, however, can be irrigated by use of furrows and borders.

Studies have been made to determine future water needs of the Area. They indicate that other sources of water are needed to supply adequate water to the Area for domestic and agricultural purposes. Plans for one major project have been made and construction started.

It is estimated that the upper Santa Ana Basin, which is mostly in the survey area, needs 81,000 acre-feet of supplemental water at present and 597,000 acre-feet ultimately. These needs are in addition to present safe local yields and importations.

The Perris Reservoir, the southeastern terminus of the State water plan, is under construction. This reservoir will have an ultimate storage capacity of 500,000 acre-feet and will utilize the canal capacity during the season of low water use.

Settlement and Development

Most of the acreage in the survey area was originally part of several large Spanish land grants secured by early settlers in areas where surface water and grazing land were available. When water became available for irrigation, many of the land grants were subdivided. Because of real estate taxes and because the suburbs are steadily expanding into areas formerly used for farming, subdividing of the land grants has continued. One of the last large land grant ranches, the 95,000-acre Vail ranch, was subdivided in 1964.

About 90 percent of the land in the Area is in private ownership. A considerable acreage, however, is in public ownership, such as March Air Force Base, county and city parks, and metropolitan water district holdings around Lake Mathews. All of the national forest land is

excluded from the Area, except for about 2,900 acres along the northern boundary. Six Indian reservations of about 63,600 acres are included in the survey area.

The area making up Riverside County was originally part of San Diego and San Bernardino Counties. In 1893, Riverside County was officially recognized, and the county seat was established at Riverside. The total population in the Western Riverside Area in 1965 was estimated at 313,300, and more than 90,000 of this number were in rural areas. Communities, urban in character but not incorporated, are included with the rural population. Included in the incorporated urban areas are Banning, Beaumont, Corona, Elsinore, Hemet, Perris, Riverside, San Jacinto, and Sun City.

Elementary and secondary schools serve all parts of the Area. Two junior colleges and the University of California at Riverside also are in the Area. Several other junior colleges, State colleges, and universities are within short distances.

Electricity and natural gas are supplied to nearly all parts of the Area. Bottled gas is available in the more isolated areas. Telephone service is supplied to most of the Area, and television, shopping centers, and other modern conveniences also are available. There are also churches of many demoninations, hospitals, and many social and business groups in the Area.

Recreation is readily available in the Western Riverside Area. Lakes and ponds provide fishing and water sports. Pheasant, duck, dove, and quail hunting clubs, sunbathing camps, and scout camps are also provided. There are three ranger districts in two national forests along the border of the Area. Several State parks and numerous county and city parks are also available.

Major industries in the Area are related to farming, manufacturing, construction, transportation, trade, finance, services, and Government. Two industries closely connected with farming are the generation and distribution of electrical power and the distribution of water for irrigation.

Much of the income from farms in the Area is from the principal crops, such as citrus, deciduous fruits, hay, and grain. Other farm income comes chiefly from dairy products and beef cattle.

Some mining is done in Temescal Canyon. The products mined are silica sand for glass, clay for drain pipe and bricks, and colored rock for composition shingles.

Twenty percent of the manufacturing in the Area is related to aerospace firms connected with the Government defense effort. Other major governmental activities are the March Air Force Base, the Citrus Research Center, Dryland Research Center at the University of California at Riverside, the Salinity Laboratory, and other argiculture research projects.

Throughout the Area, State highways and secondary roads connect smaller communities, and U.S. Highways help to speed traffic to major centers. Transcontinental truck lines, airlines, and three railroads provide shipping facilities and transportation. The Ontario International Airport is 15 miles from Riverside, where some north to south flights on the west coast originate. Connections are made between Riverside and the Los Angeles International Airport by limousine and helicopter.

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Glossary

Alkali soil. Generally, a highly alkaline soil. Specifically, an alkali soil has so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that the growth of most crop plants is low from this cause.

Alluvial fan. A fan-shaped deposit of sand, gravel, and fine material dropped by a stream where it flows out onto a level plain or meets a slower stream.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity (also termed available water holding capacity). Amount of moisture held in soil between field capacity, or about one-third atmosphere of tension, and the wilting coefficient, or about 15 atmospheres of tension.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in many soils of warm-temperate areas, as in the Southwestern

States. The material may consist of soft, thin layers in the soil or of hard, thick beds just beneath the solum, or it may be exposed at the surface by erosion.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Depth, effective rooting. The depth of soil material which plant roots can penetrate readily to obtain water and plant nutrients.

Drainage, altered. Changes in drainage commonly as the result of reclamation through artificial drainage or irrigation, but also because of natural deepening of the stream channels, the filling of depressions, or from wetness caused by seepage from drainage ditches or irrigation channels.

Drainage, natural. Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also rapidly permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and in Podzolic soils commonly have mottlings below 6 to 16 inches, in the lower A horizon and in the B and C horizons.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Effervescence. The fizz observed when dilute hydrochloric acid is applied to a soil containing free carbonates. The amount of effervescence is divided into four classes—*very slightly effervescent, slightly effervescent, strongly effervescent,* and *violently effervescent.*

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Fallow. Cropland left idle in order to restore productivity, mainly through accumulation of water, nutrients, or both. Summer fallow is a common stage before cereal grain in regions of limited rainfall. The soil is tilled for at least one growing season to control weeds, to aid decomposition of plant residues, and to encourage the storage of moisture for the succeeding grain crop.

Fanglomerate. Heterogeneous materials that were originally deposited in an alluvial fan but that since deposition have been cemented into solid rock.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has been allowed to drain away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Hardpan. A hardened or cemented soil horizon, or layer. The soil material may be sandy or clayey, and it may be cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Igneous rock. A rock produced by the cooling of melted mineral material, such as granite, andesite, diorite, and basalt.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to relatively level plots surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops, or in orchards, to confine the flow of water to one direction.

Furrow.—Water is applied in small ditches made by cultivation implements used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Irrigation water, released at high points, flows onto the field without controlled distribution.

Leaching. The removal of soluble materials from the soils by percolating water.

Leveling (of land). The reshaping, or modification of the soil surface to a planned grade to permit uniform distribution of

irrigation water without erosion or to provide proper surface drainage.

Lime. Chemically, lime is calcium oxide, but as the term is commonly used, it is also calcium carbonate and calcium hydroxide. Agricultural lime refers to ground limestone, hydrated lime, or burned lime, with or without magnesium minerals.

Metamorphic rocks. Rocks of any origin that have been completely changed physically by pressure, heat, and movement. Such rocks are nearly always crystalline. Examples: Mica-schist and serpentine.

Microrelief. Minor surface irregularities of the land, such as low mounds or pits.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permanent wilting point. See Wilting point.

Permeability. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Plowpan. A compacted layer formed in the soil immediately below the plowed layer.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Saline soil. A soil that contains soluble salts in amounts that impair growth of plants but that does not contain excess exchangeable sodium.

Saline-alkali soil. A soil that contains a harmful quantity of salts and either a high degree of alkalinity, a large amount of exchangeable sodium, or both, so distributed in the soil profile that growth of most crop plants is less than normal.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Sedimentary rock. A rock largely composed of particles deposited from suspension in water. The chief sedimentary rocks are conglomerate, from gravel; sandstone, from sand; shale, from clay; and limestone, from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sands have been consolidated into sandstone.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Substratum. Technically, the part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which plants (specifically sunflower) wilt so much that they do not recover when placed in a dark, humid atmosphere.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. Dashes in a column mean that the particular mapping unit is not suitable for that use. For information on vegetative groups, see section beginning on page 82, for information about the storie index ratings, see section beginning on page 96, and for information about wildlife see section beginning on page 101. Other information is given in tables as follows:

Acreage and extent, table 1, p. 7.
Estimated yields, tables 2 and 3 on pages 84 and 94 respectively.
Engineering uses for soils, tables 4, 5, and 6, pp. 104 through 135.
Recreational uses, table 7, p. 136.

Map symbol	Mapping unit	Page	Capability unit: Irrigated Symbol	Irrigated Page	Dryland Symbol	Dryland Page	Vegetative soil group	Range site: Site	Range site: Page	Storie index rating: Number
AaD	Altamont clay, 5 to 15 percent slopes	11	IIIe-5 (19)	75	------------	--	C	Clayey	98	28
AaE2	Altamont clay, 15 to 25 percent slopes, eroded	11	IVe-5 (19)	78	------------	--	C	Clayey	98	25
AaF	Altamont clay, 25 to 50 percent slopes	10	------------	--	VIe-5 (19)	80	C	Clayey	98	13
AbF	Altamont cobbly clay, 8 to 35 percent slopes	11	IVe-5 (19)	78	------------	--	C	Clayey	98	20
AcC	Anza fine sandy loam, 2 to 8 percent slopes	11	IIe-1 (20)	73	IVec-1 (20)	78	A	Loamy Uplands	101	81
AdA	Anza loam, 0 to 2 percent slopes	12	I-1 (20)	73	IVec-1 (20)	78	A	Loamy Uplands	101	77
AdC	Anza loam, 2 to 8 percent slopes	12	IIe-1 (20)	73	IVec-1 (20)	78	A	Loamy Uplands	101	81
AkC	Arbuckle loam, 2 to 8 percent slopes	12	IIe-1 (19)	73	------------	--	A	Loamy	99	77
AkD	Arbuckle loam, 8 to 15 percent slopes	13	IIIe-1 (19)	74	------------	--	A	Loamy	99	69
AlC	Arbuckle gravelly loam, 2 to 8 percent slopes	12	IIe-1 (19)	73	------------	--	A	Loamy	99	64
AlD	Arbuckle gravelly loam, 8 to 15 percent slopes	12	IIIe-1 (19)	74	------------	--	A	Loamy	99	61
AlE	Arbuckle gravelly loam, 15 to 25 percent slopes	12	IVe-1 (19)	77	------------	--	A	Loamy	99	51
AlE3	Arbuckle gravelly loam, 2 to 25 percent slopes, severely eroded	13	------------	--	VIe-1 (19)	80	A	Shallow Loamy	99	25
AmC	Arbuckle gravelly clay loam, 2 to 8 percent slopes	13	IIe-1 (19)	73	------------	--	A	Loamy	99	64
AnC	Arlington fine sandy loam, 2 to 8 percent slopes	13	IIIe-8 (19)	75	------------	--	G	Loamy	99	56
AnD	Arlington fine sandy loam, 8 to 15 percent slopes	14	IVe-8 (19)	78	------------	--	G	Loamy	99	50
AoA	Arlington fine sandy loam, deep, 0 to 2 percent slopes	14	IIs-8 (19)	74	------------	--	A	Loamy	99	76
AoC	Arlington fine sandy loam, deep, 2 to 8 percent slopes	14	IIIe-1 (19)	74	------------	--	A	Loamy	99	72
AoD	Arlington fine sandy loam, deep, 8 to 15 percent slopes	14	IVe-1 (19)	77	------------	--	A	Loamy	99	62
ApB	Arlington loam, 2 to 5 percent slopes	13	IIIe-8 (19)	75	------------	--	G	Loamy	99	59
ArB	Arlington loam, deep, 0 to 5 percent slopes	14	IIe-1 (19)	73	------------	--	A	Loamy	99	72
ArD	Arlington loam, deep, 5 to 15 percent slopes	14	IIIe-1 (19)	74	------------	--	A	Loamy	99	62
AtC2	Arlington and Greenfield fine sandy loams, 2 to 8 percent slopes, eroded	14	IIIe-8 (19)	75	------------	--	G	Loamy	99	56, 86

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AtD2	Arlington and Greenfield fine sandy loams, 8 to 15 percent slopes, eroded------------------	14	IVe-8 (19)	78	------------	--	G	Loamy	99	50, 77
AtF3	Arlington and Greenfield fine sandy loams, 15 to 35 percent slopes, severely eroded---------	14	------------	--	VIe-8 (19), VIe-1 (19)	81, 80	G, A	Loamy	99	19, 61
AuC	Auld clay, 2 to 8 percent slopes--	15	IIe-5 (19)	73	------------	--	C	Clayey	98	41
AuD	Auld clay, 8 to 15 percent slopes-	15	IIIe-5 (19)	75	------------	--	C	Clayey	98	35
AyF	Auld cobbly clay, 8 to 50 percent slopes-------------------------	15	------------	--	VIe-5 (19)	80	C	Clayey	98	17
BaG	Badland--------------------------	15	------------	--	VIIIe-1 (19, 20)	82	J	---------	--	5
Bb	Bishop silt loam------------------	16	------------	--	VIw-1 (20)	81	E	Cienega	100	14
BdC	Bonsall fine sandy loam, 2 to 8 percent slopes------------------	16	IVe-3 (19)	78	------------	--	D	Claypan	98	41
BdD	Bonsall fine sandy loam, 8 to 15 percent slopes------------------	17	IVe-3 (19)	78	------------	--	D	Claypan	98	36
BfC	Bosanko clay, 2 to 8 percent slopes-------------------------	17	IIIe-5 (19)	75	------------	--	C	Clayey	98	33
BfD	Bosanko clay, 8 to 15 percent slopes-------------------------	18	IIIe-5 (19)	75	------------	--	C	Clayey	98	31
BhA	Buchenau loam, slightly saline-alkali, 0 to 2 percent slopes---	18	IIs-8 (19)	74	------------	--	F	Loamy	99	41
BhC	Buchenau loam, slightly saline-alkali, 2 to 8 percent slopes---	18	IIIe-6 (19)	75	------------	--	F	Loamy	99	31
BkC2	Buchenau silt loam, 2 to 8 percent slopes, eroded-----------------	19	IIIe-1 (19)	74	------------	--	A	Loamy	99	64
BsC2	Bull Trail sandy loam, 5 to 8 percent slopes, eroded----------	19	------------	--	IVec-1 (20)	78	A	Loamy Uplands	101	69
BsD2	Bull Trail sandy loam, 8 to 15 percent slopes, eroded----------	19	------------	--	IVec-1 (20)	78	A	Loamy Uplands	101	58
BsE3	Bull Trail sandy loam, 8 to 25 percent slopes, severely eroded-	19	------------	--	VIIe-1 (20)	81	A	Loamy Uplands	101	27
BtD2	Bull Trail stony sandy loam, 8 to 15 percent slopes, eroded-------	20	------------	--	VIe-7 (20)	80	A	Loamy Uplands	101	38
BtE3	Bull Trail stony sandy loam, 8 to 25 percent slopes, severely eroded-------------------------	20	------------	--	VIe-7 (20)	80	A	Loamy Uplands	101	19
BuC2	Buren fine sandy loam, 2 to 8 percent slopes, eroded----------	20	IIIe-8 (19)	75	------------	--	G	Loamy	99	56
BuD2	Buren fine sandy loam, 8 to 15 percent slopes, eroded----------	20	IVe-8 (19)	78	------------	--	G	Loamy	99	50
BvD3	Buren loam, 5 to 15 percent slopes, severely eroded---------	21	IVe-8 (19)	78	------------	--	G	Loamy	99	36
BxC2	Buren loam, deep, 2 to 8 percent slopes, eroded------------------	21	IIe-1 (19)	73	------------	--	A	Loamy	99	69
CaC2	Cajalco fine sandy loam, 2 to 8 percent slopes, eroded----------	21	IIIe-1 (19)	74	------------	--	A	Loamy	99	60
CaD2	Cajalco fine sandy loam, 8 to 15 percent slopes, eroded----------	21	IVe-1 (19)	77	------------	--	A	Loamy	99	55
CaF2	Cajalco fine sandy loam, 15 to 35 percent slopes, eroded----------	21	------------	--	VIe-1 (19)	80	A	Shallow Loamy	99	42

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CbD2	Cajalco rocky fine sandy loam, 5 to 15 percent slopes, eroded--	22	------------	--	VIe-7 (19)	80	A	Shallow Loamy	99	24
CbF2	Cajalco rocky fine sandy loam, 15 to 50 percent slopes, eroded-	22	------------	--	VIe-7 (19)	80	A	Shallow Loamy	99	13
CcC2	Calpine sandy loam, 2 to 8 percent slopes, eroded------------------	22	IIe-1 (20)	73	IVec-1 (20)	78	A	Loamy Uplands	101	81
CcD2	Calpine sandy loam, 8 to 15 percent slopes, eroded----------	22	IIIe-1 (20)	74	IVec-1 (20)	78	A	Loamy Uplands	101	69
CdC2	Calpine loam, 2 to 8 percent slopes, eroded------------------	23	IIe-1 (20)	73	IVec-1 (20)	78	A	Loamy Uplands	101	86
Ce	Chino silt loam, drained----------	23	I-1 (19)	72	------------	--	A	Silty Basin	100	51
Cf	Chino silt loam, drained, saline-alkali--------------------------	23	IVs-6 (19)	79	------------	--	F	Silty Basin	100	20
Cg	Chino silt loam, strongly saline-alkali--------------------------	23	IVw-6 (19)	79	------------	--	F	Silty Basin	100	6
ChC	Cieneba sandy loam, 5 to 8 percent slopes--------------------------	24	IVe-1 (19)	77	------------	--	A	Shallow Loamy	99	44
ChD2	Cieneba sandy loam, 8 to 15 percent slopes, eroded-------------	24	------------	--	VIe-1 (19)	80	A	Shallow Loamy	99	37
ChF2	Cieneba sandy loam, 15 to 50 percent slopes, eroded-------------	24	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	22
CkD2	Cieneba rocky sandy loam, 8 to 15 percent slopes, eroded----------	24	------------	--	VIe-7 (19)	80	A	Shallow Loamy	99	21
CkF2	Cieneba rocky sandy loam, 15 to 50 percent slopes, eroded----------	23	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	14
ClC	Cortina gravelly loamy sand, 2 to 8 percent slopes----------------	25	------------	--	VIIw-4 (19)	82	J	Sandy Alluvial	99	13
CmC	Cortina cobbly loamy sand, 2 to 8 percent slopes------------------	25	------------	--	VIIw-4 (19)	82	J	Sandy Alluvial	99	12
CnC	Cortina gravelly coarse sandy loam, 2 to 8 percent slopes-----	24	IIIs-4 (19)	77	------------	--	B	Sandy	99	42
CoA	Cortina sandy loam, 0 to 2 percent slopes--------------------------	25	IIIs-0 (19)	76	------------	--	B	Sandy	99	65
CpA	Cortina gravelly sandy loam, 0 to 2 percent slopes----------------	25	IVs-0 (19)	79	------------	--	B	Sandy	99	25
CrD	Cortina cobbly sandy loam, 2 to 12 percent slopes------------------	25	IVs-4 (19)	79	------------	--	B	Sandy	99	36
CsF2	Crafton rocky sandy loam, 25 to 50 percent slopes, eroded----------	25	------------	--	VIe-7 (20)	80	A	Loamy Uplands	101	10
CtF2	Crafton fine sandy loam, 15 to 35 percent slopes, eroded----------	26	------------	--	VIe-1 (20)	80	A	Loamy Uplands	101	34

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CuE	Crafton rocky fine sandy loam, 15 to 25 percent slopes	26	------------	--	VIe-7 (20)	80	A	Loamy Uplands	101	24
CvD2	Crouch loamy sand, 8 to 15 percent slopes, eroded	27	------------	--	IVec-1 (20)	78	B	Coarse Sandy	100	34
CwD2	Crouch sandy loam, 8 to 15 percent slopes, eroded	27	------------	--	IVec-1 (20)	78	A	Loamy Uplands	101	40
CwE2	Crouch sandy loam, 15 to 25 percent slopes, eroded	27	------------	--	VIe-1 (20)	80	A	Loamy Uplands	101	35
CyE2	Crouch rocky sandy loam, 8 to 25 percent slopes, eroded	27	------------	--	VIe-7 (20)	80	A	Loamy Uplands	101	23
CyF2	Crouch rocky sandy loam, 25 to 50 percent slopes, eroded	26	------------	--	VIe-7 (20)	80	A	Loamy Uplands	101	12
DaD2	Delhi fine sand, 2 to 15 percent slopes, wind-eroded	27	IIIe-4 (19)	75	------------	--	B	Sandy	99	42
DbA	Delhi loamy fine sand, 0 to 2 percent slopes	27	IIe-4 (19)	73	------------	--	B	Sandy	99	72
DgB	Dello loamy sand, 0 to 5 percent slopes	28	IIIw-4 (19)	76	------------	--	B	Sandy	99	46
DmA	Dello loamy sand, poorly drained, 0 to 2 percent slopes	28	------------	--	VIIw-4 (19)	82	J	Sandy Alluvial	99	19
DnB	Dello loamy sand, gravelly substratum, 0 to 5 percent slopes	28	IVw-0 (19)	79	------------	--	B	Sandy	99	30
DoA	Dello loamy fine sand, 0 to 2 percent slopes	28	IIIw-4 (19)	76	------------	--	E	Sandy	99	51
DpB	Dello loamy fine sand, saline-alkali, 0 to 5 percent slopes	28	IIIw-6 (19)	76	------------	--	F	Sandy	99	28
DrA	Dello loamy fine sand, gravelly substratum, 0 to 2 percent slopes	28	IIIw-0 (19)	76	------------	--	B	Sandy	99	41
Ds2	Domino fine sandy loam, eroded	29	IIIe-8 (19)	75	------------	--	G	Sandy Basin	100	41
Dt	Domino fine sandy loam, saline-alkali	29	IIIs-6 (19)	77	------------	--	F	Sandy Basin	100	24
Du	Domino silt loam	29	IIIs-8 (19)	77	------------	--	G	Silty Basin	100	43
Dv	Domino silt loam, saline-alkali	29	IIIs-6 (19)	77	------------	--	F	Silty Basin	100	24
Dw	Domino silt loam, strongly saline-alkali	30	IVw-6 (19)	79	------------	--	F	Silty Basin	100	7
EcC2	Escondido fine sandy loam, 2 to 8 percent slopes, eroded	30	IIIe-8 (19)	75	------------	--	G	Loamy	99	54
EcD2	Escondido fine sandy loam, 8 to 15 percent slopes, eroded	30	IVe-8 (19)	78	------------	--	G	Loamy	99	48
EcE2	Escondido fine sandy loam, 15 to 25 percent slopes, eroded	30	------------	--	VIe-8 (19)	81	G	Loamy	99	45
EfF2	Escondido rocky fine sandy loam, 8 to 50 percent slopes, eroded	30	------------	--	VIe-8 (19)	81	G	Loamy	99	50
EnA	Exeter sandy loam, 0 to 2 percent slopes	31	IIIs-8 (19)	77	------------	--	G	Loamy	99	56
EnC2	Exeter sandy loam, 2 to 8 percent slopes, eroded	31	IIIe-8 (19)	75	------------	--	G	Loamy	99	53

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EoB	Exeter sandy loam, slightly saline-alkali, 0 to 5 percent slopes----	31	IIIs-6 (19)	77	-----------	--	F	Loamy	99	40
EpA	Exeter sandy loam, deep, 0 to 2 percent slopes------------------	31	IIs-8 (19)	74	-----------	--	A	Loamy	99	68
EpC2	Exeter sandy loam, deep, 2 to 8 percent slopes, eroded----------	31	IIe-1 (19)	73	-----------	--	A	Loamy	99	61
EwB	Exeter very fine sandy loam, 0 to 5 percent slopes------------------	32	IIIe-8 (19)	75	-----------	--	G	Loamy	99	56
EyB	Exeter very fine sandy loam, deep, 0 to 5 percent slopes-----------	32	IIe-1 (19)	73	-----------	--	A	Loamy	99	68
FaD2	Fallbrook sandy loam, 8 to 15 percent slopes, eroded----------	32	IVe-1 (19)	77	-----------	--	A	Loamy	99	45
FaE2	Fallbrook sandy loam, 15 to 25 percent slopes, eroded----------	32	------------	--	VIe-1 (19)	80	A	Loamy	99	44
FbC2	Fallbrook sandy loam, shallow, 5 to 8 percent slopes, eroded---------	32	IVe-1 (19)	77	-----------	--	G	Shallow Loamy	99	25
FbF2	Fallbrook sandy loam, shallow, 15 to 35 percent slopes, eroded-----	33	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	22
FcD2	Fallbrook rocky sandy loam, shallow, 8 to 15 percent slopes, eroded--------------------------	33	------------	--	VIe-7 (19)	80	G	Shallow Loamy	99	15
FcF2	Fallbrook rocky sandy loam, shallow, 15 to 50 percent slopes, eroded--------------------------	33	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	9
FfC2	Fallbrook fine sandy loam, 2 to 8 percent slopes, eroded----------	33	IIIe-1 (19)	74	-----------	--	A	Loamy	99	53
FkD2	Fallbrook fine sandy loam, shallow, 8 to 15 percent slopes, eroded---	33	IVe-1 (19)	77	-----------	--	G	Shallow Loamy	99	24
FwE2	Friant fine sandy loam, 5 to 25 percent slopes, eroded----------	34	------------	--	VIe-8 (19)	81	G	Shallow Loamy	99	22
FyE2	Friant rocky fine sandy loam, 8 to 25 percent slopes, eroded--------	34	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	16
FyF2	Friant rocky fine sandy loam, 25 to 50 percent slopes, eroded--------	33	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	8
GaA	Garretson very fine sandy loam, 0 to 2 percent slopes-------------	34	I-1 (19)	72	-----------	--	A	Loamy	99	100
GaC	Garretson very fine sandy loam, 2 to 8 percent slopes-------------	34	IIe-1 (19)	73	-----------	--	A	Loamy	99	90
GaD2	Garretson very fine sandy loam, 8 to 15 percent slopes, eroded-----	34	IIIe-1 (19)	74	-----------	--	A	Loamy	99	81
GdA	Garretson gravelly very fine sandy loam, 0 to 2 percent slopes------	35	IIs-4 (19)	74	-----------	--	A	Loamy	99	75
GdC	Garretson gravelly very fine sandy loam, 2 to 8 percent slopes------	34	IIe-1 (19)	73	-----------	--	A	Loamy	99	71
GdD2	Garretson gravelly very fine sandy loam, 8 to 15 percent slopes, eroded--------------------------	35	IIIe-1 (19)	74	-----------	--	A	Loamy	99	61
GeG3	Gaviota rocky fine sandy loam, 25 to 75 percent slopes, severely eroded--------------------------	35	------------	--	VIIIs-1 (19, 20)	82	J	---------	--	3

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GfF2	Gaviota very fine sandy loam, 15 to 50 percent slopes, eroded----	35	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	14
GgF2	Gaviota rocky very fine sandy loam, 25 to 50 percent slopes, eroded--------------------------	35	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	8
GhC	Gorgonio loamy sand, 0 to 8 percent slopes---------------------	36	IIIs-4 (19)	77	------------	--	B	Sandy	99	57
GhD	Gorgonio loamy sand, 8 to 15 percent slopes---------------------	36	IVs-4 (19)	79	------------	--	B	Sandy	99	54
GkD	Gorgonio loamy sand, channeled, 2 to 15 percent slopes----------	36	------------	--	VIIw-4 (19)	82	J	Sandy Alluvial	99	27
GlC	Gorgonio loamy sand, deep, 2 to 8 percent slopes-----------------	36	IIs-4 (19)	74	------------	--	B	Sandy	99	68
GmD	Gorgonio gravelly loamy fine sand, 2 to 15 percent slopes----------	35	IVs-4 (19)	79	------------	--	B	Sandy	99	45
GnD	Gorgonio cobbly loamy fine sand, 2 to 15 percent slopes----------	36	------------	--	VIe-7 (19)	80	B	Sandy	99	31
GoB	Grangeville loamy fine sand, drained, 0 to 5 percent slopes--	37	IIs-4 (19)	74	------------	--	A	Sandy Basin	100	55
GpB	Grangeville sandy loam, drained, saline-alkali, 0 to 5 percent slopes--------------------------	37	IIIs-6 (19)	77	------------	--	F	Sandy Basin	100	51
GrB	Grangeville sandy loam, sandy substratum, drained, 0 to 5 percent slopes-------------------------	37	IIIs-0 (19)	76	------------	--	B	Sandy Basin	100	58
GsB	Grangeville sandy loam, sandy substratum, drained, saline-alkali, 0 to 5 percent slopes-----------	37	IIIs-6 (19)	77	------------	--	F	Sandy Basin	100	39
GtA	Grangeville fine sandy loam, drained, 0 to 2 percent slopes--	37	I-1 (19)	72	------------	--	A	Sandy Basin	100	71
GtD	Grangeville fine sandy loam, drained, 5 to 15 percent slopes-	38	IIIe-6 (19)	75	------------	--	A	Sandy Basin	100	61
GuB	Grangeville fine sandy loam, poorly drained, saline-alkali, 0 to 5 percent slopes----------	38	IVw-6 (19)	79	------------	--	F	Sandy Basin	100	9
GvB	Grangeville fine sandy loam, saline-alkali, 0 to 5 percent slopes-------------------------	38	IIIw-6 (19)	76	------------	--	F	Sandy Basin	100	18
GwA	Grangeville fine sandy loam, loamy substratum, drained, 0 to 2 percent slopes-----------------	38	I-1 (19)	72	------------	--	A	Sandy Basin	100	67
GxA	Grangeville fine sandy loam, loamy substratum, drained, saline-alkali, 0 to 2 percent slopes---	38	IIIs-6 (19)	77	------------	--	F	Sandy Basin	100	23
GyA	Greenfield sandy loam, 0 to 2 percent slopes-----------------	39	I-1 (19)	72	------------	--	A	Loamy	99	90

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GyC2	Greenfield sandy loam, 2 to 8 percent slopes, eroded	38	IIe-1 (19)	73	------------	--	A	Loamy	99	81
GyD2	Greenfield sandy loam, 8 to 15 percent slopes, eroded	39	IIIe-1 (19)	74	------------	--	A	Loamy	99	73
GyE2	Greenfield sandy loam, 15 to 25 percent slopes, eroded	39	IVe-1 (19)	77	------------	--	A	Loamy	99	65
GzG	Gullied land	39	------------	--	VIIIe-1 (19, 20)	82	J	--------	--	5
HaC	Hanford loamy fine sand, 0 to 8 percent slopes	40	IIs-4 (19)	74	IVsc-4 (20)	80	A	Sandy	99	81
HcA	Hanford coarse sandy loam, 0 to 2 percent slopes	40	IIs-4 (19)	74	------------	--	A	Sandy	99	77
HcC	Hanford coarse sandy loam, 2 to 8 percent slopes	39	IIe-1 (19)	73	IVec-1 (20)	78	A	Sandy	99	86
HcD2	Hanford coarse sandy loam, 8 to 15 percent slopes, eroded	40	IIIe-1 (19)	74	IVec-1 (20)	78	A	Sandy	99	65
HdD2	Hanford cobbly coarse sandy loam, 2 to 15 percent slopes, eroded	40	------------	--	VIe-7 (19), VIe-7 (20)	80	B	Sandy	99	26
HeC2	Hanford coarse sandy loam, deep, 2 to 8 percent slopes, eroded	40	IIIs-0 (19)	76	------------	--	B	Sandy	99	62
HfD	Hanford sandy loam, 2 to 15 percent slopes	40	------------	--	VIIw-4 (19)	82	J	Sandy Alluvial	99	41
HgA	Hanford fine sandy loam, 0 to 2 percent slopes	40	I-1 (19)	72	------------	--	A	Loamy	99	100
HhA2	Hilmar loamy sand, 0 to 2 percent slopes, eroded	41	IIe-4 (19)	73	------------	--	A	Sandy	99	62
H1A	Hilmar loamy very fine sand, 0 to 2 percent slopes	41	IIe-4 (19)	73	------------	--	A	Sandy	99	51
H1C	Hilmar loamy very fine sand, 2 to 8 percent slopes	41	IIIe-1 (19)	74	------------	--	A	Sandy	99	49
HnC	Honcut sandy loam, 2 to 8 percent slopes	41	IIe-1 (19)	73	------------	--	A	Loamy	99	86
HnD2	Honcut sandy loam, 8 to 15 percent slopes, eroded	42	IIIe-1 (19)	74	------------	--	A	Loamy	99	73
HoE	Honcut cobbly sandy loam, 2 to 25 percent slopes	42	------------	--	VIIw-4 (19)	82	J	Sandy Alluvial	99	20
HuC2	Honcut loam, 2 to 8 percent slopes, eroded	42	IIe-1 (19)	73	------------	--	A	Loamy	99	90
LaC	Las Posas loam, 2 to 8 percent slopes	43	IIIe-1 (19)	74	------------	--	G	Loamy	99	53
LaC2	Las Posas loam, 5 to 8 percent slopes, eroded	43	IVe-1 (19)	77	------------	--	G	Loamy	99	42
LaD2	Las Posas loam, 8 to 15 percent slopes, eroded	42	IVe-1 (19)	77	------------	--	G	Loamy	99	47
LaE3	Las Posas loam, 8 to 25 percent slopes, severely eroded	43	------------	--	VIe-1 (19)	80	G	Shallow Loamy	99	29
LcD2	Las Posas stony loam, 8 to 15 percent slopes, eroded	43	------------	--	VIe-7 (19)	80	G	Loamy	99	28
LkD2	Las Posas rocky loam, 8 to 15 percent slopes, eroded	43	------------	--	VIe-7 (19)	80	G	Loamy	99	22
LkF3	Las Posas rocky loam, 15 to 50 percent slopes, severely eroded	43	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	13
LoF2	Lodo gravelly loam, 15 to 50 percent slopes, eroded	44	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	10

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LpE2	Lodo rocky loam, 8 to 25 percent slopes, eroded	43	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	10
LpF2	Lodo rocky loam, 25 to 50 percent slopes, eroded	44	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	6
MaA	Madera fine sandy loam, 0 to 2 percent slopes	44	IIIs-3 (19)	76	------------	--	D	Claypan	98	32
MaB2	Madera fine sandy loam, 2 to 5 percent slopes, eroded	44	IIIe-3 (19)	74	------------	--	D	Claypan	98	30
MaD2	Madera fine sandy loam, 5 to 15 percent slopes, eroded	45	IVe-3 (19)	78	------------	--	D	Claypan	98	27
MbC2	Madera fine sandy loam, shallow, 2 to 8 percent slopes, eroded	45	IVe-3 (19)	78	------------	--	D	Claypan	98	21
MdC	Metz loamy sand, 2 to 8 percent slopes	45	IIIs-4 (19)	77	------------	--	B	Sandy	99	58
MeD	Metz loamy sand, channeled, 0 to 15 percent slopes	45	------------	--	VIIw-4 (19)	82	J	Sandy Alluvial	99	29
MfA	Metz loamy fine sand, 0 to 2 percent slopes	45	IIIs-4 (19)	77	------------	--	B	Sandy	99	77
MgB	Metz loamy fine sand, gravelly sand substratum, 0 to 5 percent slopes	45	IVs-0 (19)	79	------------	--	B	Sandy	99	69
MhB	Metz loamy fine sand, sandy loam substratum, 0 to 5 percent slopes	45	IIs-4 (19)	74	------------	--	A	Sandy	99	73
MlD	Metz gravelly sandy loam, 2 to 15 percent slopes	46	IIIs-4 (19)	77	------------	--	A	Sandy	99	42
MmB	Monserate sandy loam, 0 to 5 percent slopes	46	IIIe-8 (19)	75	------------	--	G	Loamy	99	30
MmC2	Monserate sandy loam, 5 to 8 percent slopes, eroded	46	IIIe-8 (19)	75	------------	--	G	Loamy	99	29
MmD2	Monserate sandy loam, 8 to 15 percent slopes, eroded	47	IVe-8 (19)	78	------------	--	G	Loamy	99	26
MmE3	Monserate sandy loam, 15 to 25 percent slopes, severely eroded	47	------------	--	VIe-8 (19)	81	G	Loamy	99	18
MnD2	Monserate sandy loam, shallow, 5 to 15 percent slopes, eroded	47	------------	--	VIe-8 (19)	81	G	Shallow Loamy	99	17
MnE3	Monserate sandy loam, shallow, 15 to 25 percent slopes, severely eroded	47	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	15
MoC	Mottsville loamy sand, 2 to 8 percent slopes	47	IIIs-4 (20)	77	IVsc-4 (20)	80	B	Coarse Sandy	100	57
MoD	Mottsville loamy sand, 8 to 15 percent slopes	47	IVs-4 (20)	79	IVsc-4 (20)	80	B	Coarse Sandy	100	48
MrE	Mottsville cobbly loamy sand, 8 to 25 percent slopes	47	------------	--	VIIw-4 (20)	82	J	Coarse Sandy	100	16
MsC	Mottsville sandy loam, 2 to 8 percent slopes	48	IIIs-4 (20)	77	IVsc-4 (20)	80	A	Coarse Sandy	100	86
MsD	Mottsville sandy loam, 8 to 15 percent slopes	48	IIIs-4 (20)	77	IVsc-4 (20)	80	A	Coarse Sandy	100	69

Map symbol	Mapping unit	Page	Capability unit: Irrigated Symbol	Irrigated Page	Capability unit: Dryland Symbol	Dryland Page	Vegetative soil group	Range site: Site	Range site: Page	Storie index rating: Number
MtE2	Mottsville cobbly sandy loam, 8 to 25 percent slopes, eroded-------	48	------------	--	VIs-7 (20)	81	A	Coarse Sandy	100	35
MuE	Murrieta stony clay loam, 2 to 25 percent slopes------------------	48	------------	--	VIe-7 (19)	80	D	Shallow Clayey	98	22
OgD	Oak Glen gravelly sandy loam, 8 to 15 percent slopes---------------	49	IIIe-1 (20)	74	IVec-1 (20)	78	A	Loamy Uplands	101	44
OgE	Oak Glen gravelly sandy loam, 15 to 25 percent slopes------------	49	IVe-1 (20)	78	IVec-1 (20)	78	A	Loamy Uplands	101	39
OkD	Oak Glen fine sandy loam, 5 to 15 percent slopes------------------	49	IIIe-1 (20)	74	IVec-1 (20)	78	A	Loamy Uplands	101	85
PaA	Pachappa fine sandy loam, 0 to 2 percent slopes------------------	50	I-1 (19)	72	------------	--	A	Loamy	99	95
PaC2	Pachappa fine sandy loam, 2 to 8 percent slopes, eroded----------	49	IIe-1 (19)	73	------------	--	A	Loamy	99	86
PeC	Perkins loam, 2 to 8 percent slopes--------------------------	51	IIIe-3 (19)	74	------------	--	D	Claypan	98	69
PgB	Perkins gravelly loam, 2 to 5 percent slopes--------------------	51	IIIe-3 (19)	74	------------	--	D	Claypan	98	58
PgC	Perkins gravelly loam, 5 to 8 percent slopes--------------------	50	IIIe-3 (19)	74	------------	--	D	Claypan	98	58
PgD2	Perkins gravelly loam, 8 to 15 percent slopes, eroded----------	51	IVe-3 (19)	78	------------	--	D	Claypan	98	49
PlB	Placentia fine sandy loam, 0 to 5 percent slopes------------------	51	IVe-3 (19)	78	------------	--	D	Claypan	98	43
PlD	Placentia fine sandy loam, 5 to 15 percent slopes------------------	52	IVe-3 (19)	78	------------	--	D	Claypan	98	38
PmE	Placentia cobbly fine sandy loam, 8 to 25 percent slopes----------	52	------------	--	VIe-7 (19)	80	D	Claypan	98	24
PoC	Porterville clay, 0 to 8 percent slopes-------------------------	52	IIe-5 (19)	73	------------	--	C	Clayey	98	49
PrD	Porterville cobbly clay, 2 to 15 percent slopes------------------	52	IVe-5 (19)	78	------------	--	C	Clayey	98	35
PsC	Porterville clay, moderately deep, 2 to 8 percent slopes-----------	52	IIIe-5 (19)	75	------------	--	C	Clayey	98	46
PtB	Porterville clay, moderately deep, slightly saline-alkali, 0 to 5 percent slopes------------------	53	IIIe-5 (19)	75	------------	--	C	Clayey	98	25
PvD2	Porterville gravelly clay, moderately deep, 2 to 15 percent slopes, eroded------------------	53	IVe-5 (19)	78	------------	--	C	Clayey	98	25
RaA	Ramona sandy loam, 0 to 2 percent slopes-------------------------	54	I-1 (19)	72	------------	--	A	Loamy	99	77
RaB2	Ramona sandy loam, 2 to 5 percent slopes, eroded------------------	53	IIe-1 (19)	73	------------	--	A	Loamy	99	77
RaB3	Ramona sandy loam, 0 to 5 percent slopes, severely eroded---------	54	IIIe-1 (19)	74	------------	--	A	Loamy	99	58
RaC2	Ramona sandy loam, 5 to 8 percent slopes, eroded------------------	54	IIIe-1 (19)	74	------------	--	A	Loamy	99	69
RaC3	Ramona sandy loam, 5 to 8 percent slopes, severely eroded---------	54	IIIe-1 (19)	74	------------	--	A	Loamy	99	58
RaD2	Ramona sandy loam, 8 to 15 percent slopes, eroded------------------	54	IVe-1 (19)	77	------------	--	A	Loamy	99	69
RaD3	Ramona sandy loam, 8 to 15 percent slopes, severely eroded---------	54	IVe-1 (19)	77	------------	--	A	Loamy	99	55

Map symbol	Mapping unit	Page	Capability unit: Irrigated Symbol	Irrigated Page	Capability unit: Dryland Symbol	Dryland Page	Vegetative soil group	Range site: Site	Range site: Page	Storie index rating: Number
RaE3	Ramona sandy loam, 15 to 25 percent slopes, severely eroded	54	------------	--	VIe-1 (19)	80	A	Loamy	99	52
RdD2	Ramona sandy loam, moderately deep, 8 to 15 percent slopes, eroded	54	IVe-1 (19)	77	-------------	--	G	Loamy	99	54
RdE3	Ramona sandy loam, moderately deep, 15 to 25 percent slopes, severely eroded	54	------------	--	VIe-1 (19)	80	G	Loamy	99	38
ReC2	Ramona very fine sandy loam, 0 to 8 percent slopes, eroded	54	IIIe-1 (19)	74	-------------	--	A	Loamy	99	77
RfC2	Ramona very fine sandy loam, moderately deep, 0 to 8 percent slopes, eroded	54	IIIe-1 (19)	74	-------------	--	G	Loamy	99	64
RmE3	Ramona and Buren sandy loams, 15 to 25 percent slopes, severely eroded	55	------------	--	VIe-1 (19), VIe-8 (19)	80, 81	A, G	Loamy	99	49, 32
RnD2	Ramona and Buren loams, 5 to 15 percent slopes, eroded	55	IVe-8 (19)	78	-------------	--	A	Loamy	99	65, 50
RnE3	Ramona and Buren loams, 5 to 25 percent slopes, severely eroded	55	------------	--	VIe-1 (19), VIe-8 (19)	80, 81	A, G	Loamy, Shallow Loamy	99	55, 34
RsC	Riverwash	55	------------	--	VIIIw-4 (19, 20)	82	J	---------	--	--
RtF	Rock land	55	------------	--	VIIIs-1 (19, 20)	82	J	---------	--	--
RuF	Rough broken land	55	------------	--	VIIIe-1 (19, 20)	82	J	---------	--	5
SdD	San Emigdio sandy loam, channeled, 2 to 15 percent slopes	57	------------	--	VIIw-4 (19)	82	J	Sandy Alluvial	99	39
SeA	San Emigdio fine sandy loam, 0 to 2 percent slopes	56	I-1 (19)	72	------------	--	A	Loamy	99	86
SeC2	San Emigdio fine sandy loam, 2 to 8 percent slopes, eroded	56	IIe-1 (19)	73	------------	--	A	Loamy	99	86
SeD2	San Emigdio fine sandy loam, 8 to 15 percent slopes, eroded	56	IIIe-1 (19)	74	------------	--	A	Loamy	99	77
SfA	San Emigdio fine sandy loam, deep, 0 to 2 percent slopes	56	IIs-4 (19)	74	------------	--	A	Loamy	99	95
SgA	San Emigdio loam, 0 to 2 percent slopes	56	I-1 (19)	72	------------	--	A	Loamy	99	95
SgC	San Emigdio loam, 2 to 8 percent slopes	56	IIe-1 (19)	73	------------	--	A	Loamy	99	86
SgD2	San Emigdio loam, 8 to 15 percent slopes, eroded	57	IIIe-1 (19)	74	------------	--	A	Loamy	99	77
SmE2	San Timoteo loam, 8 to 25 percent slopes, eroded	57	IVe-1 (19)	77	------------	--	A	Loamy	99	41
SmF2	San Timoteo loam, 25 to 50 percent slopes, eroded	57	------------	--	VIe-1 (19)	80	A	Loamy	99	18
SnD2	Sheephead fine sandy loam, 8 to 15 percent slopes, eroded	58	------------	--	VIec-4 (20)	81	G	Shallow Loamy Uplands	101	22
SpG2	Sheephead rocky fine sandy loam, 15 to 75 percent slopes, eroded	58	------------	--	VIIe-4 (20)	81	J	Shallow Loamy Uplands	101	6

Map symbol	Mapping unit	Page	Capability unit: Irrigated Symbol	Irrigated Page	Dryland Symbol	Dryland Page	Vegetative soil group	Range site: Site	Range site Page	Storie index rating: Number
SrE	Soboba cobbly loamy sand, 2 to 25 percent slopes	58	------------	--	VIIs-4 (19)	82	J	Sandy Alluvial	99	26
SsD	Soboba stony loamy sand, 2 to 15 percent slopes	58	------------	--	VIIw-4 (19)	82	J	Sandy Alluvial	99	14
StF2	Soper loam, 15 to 35 percent slopes, eroded	59	------------	--	VIe-1 (19)	80	A	Loamy	99	35
SuF2	Soper cobbly loam, 25 to 50 percent slopes, eroded	59	------------	--	VIIe-1 (19)	81	J	Loamy	99	17
TaF2	Temescal loam, 15 to 50 percent slopes, eroded	60	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	18
TbF2	Temescal rocky loam, 15 to 50 percent slopes, eroded	59	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	12
TeG	Terrace escarpments	60	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	5
TfF2	Tollhouse rocky coarse sandy loam, 8 to 50 percent slopes, eroded	60	------------	--	VIIe-4 (20)	81	J	Shallow Loamy Uplands	101	9
ThD2	Tollhouse sandy loam, 5 to 15 percent slopes, eroded	60	------------	--	VIIe-1 (20)	81	A	Shallow Loamy Uplands	101	25
ThE2	Tollhouse sandy loam, 15 to 25 percent slopes, eroded	60	------------	--	VIIe-1 (20)	81	J	Shallow Loamy Uplands	101	22
Tp2	Traver loamy fine sand, eroded	61	IIe-1 (19)	73	------------	--	A	Sandy Basin	100	55
Tr2	Traver loamy fine sand, saline-alkali, eroded	61	IIIs-6 (19)	77	------------	--	F	Sandy Basin	100	37
Ts	Traver fine sandy loam, saline-alkali	61	IIIs-6 (19)	77	------------	--	F	Sandy Basin	100	41
Tt2	Traver fine sandy loam, strongly saline-alkali, eroded	61	IVs-6 (19)	79	------------	--	F	Sandy Basin	100	12
TuB	Tujunga loamy sand, 0 to 5 percent slopes	62	IVs-0 (19)	79	------------	--	B	Sandy	99	62
TvC	Tujunga loamy sand, channeled, 0 to 8 percent slopes	62	------------	--	VIIw-4 (19)	82	J	Sandy Alluvial	99	31
TwC	Tujunga gravelly loamy sand, 0 to 8 percent slopes	62	IVs-4 (19)	79	------------	--	B	Sandy	99	38
VaE3	Vallecitos loam, 8 to 25 percent slopes, severely eroded	62	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	23
VdF2	Vallecitos rocky loam, 8 to 50 percent slopes, eroded	63	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	12
VeC2	Vallecitos loam, thick solum variant, 2 to 8 percent slopes, eroded	63	IIIe-8 (19)	75	------------	--	G	Loamy	99	45
VeD2	Vallecitos loam, thick solum variant, 8 to 15 percent slopes, eroded	64	IVe-8 (19)	78	------------	--	G	Loamy	99	38

Map symbol	Mapping unit	Page	Capability unit: Irrigated Symbol	Page	Capability unit: Dryland Symbol	Page	Vegetative soil group	Range site: Site	Page	Storie index rating: Number
VeF2	Vallecitos loam, thick solum variant, 15 to 50 percent slopes, eroded	64	------------	--	VIe-1 (19)	80	G	Loamy	99	24
VlC2	Visalia sandy loam, 0 to 8 percent slopes, eroded	64	IIe-1 (19)	73	------------	--	A	Loamy	99	77
VmA	Visalia fine sandy loam, 0 to 2 percent slopes	64	I-1 (19)	72	------------	--	A	Loamy	99	90
VmC	Visalia fine sandy loam, 2 to 8 percent slopes	64	IIe-1 (19)	73	------------	--	A	Loamy	99	86
VsC	Vista coarse sandy loam, 2 to 8 percent slopes	65	IIIe-1 (19)	74	------------	--	A	Loamy	99	49
VsD2	Vista coarse sandy loam, 8 to 15 percent slopes, eroded	65	IVe-1 (19)	77	------------	--	A	Loamy	99	35
VsF2	Vista coarse sandy loam, 15 to 35 percent slopes, eroded	65	------------	--	VIe-1 (19)	80	A	Loamy	99	34
VtF2	Vista rocky coarse sandy loam, 2 to 35 percent slopes, eroded	65	------------	--	VIe-7 (19)	80	A	Loamy	99	23
Wa	Waukena loamy fine sand, saline-alkali	66	IIIs-6 (19)	77	------------	--	F	Sandy Basin	100	30
Wb	Waukena fine sandy loam, saline-alkali	66	IIIs-6 (19)	77	------------	--	F	Sandy Basin	100	34
Wc	Waukena fine sandy loam, strongly saline-alkali	66	IVs-6 (19)	79	------------	--	F	Sandy Basin	100	10
Wd	Waukena loam, saline-alkali	66	IIIs-6 (19)	77	------------	--	F	Silty Basin	100	11
WeD	Wet alluvial land	67	------------	--	VIw-1 (20)	81	E	Cienega	100	--
Wf	Willows silty clay	67	IIIw-5 (19)	76	------------	--	E	Silty Basin	100	40
Wg	Willows silty clay, saline-alkali	67	IIIw-6 (19)	76	------------	--	F	Silty Basin	100	25
Wh	Willows silty clay, strongly saline-alkali	67	IVw-6 (19)	79	------------	--	F	Silty Basin	100	5
Wm	Willows silty clay, deep, saline-alkali	68	IIIw-6 (19)	76	------------	--	F	Silty Basin	100	35
Wn	Willows silty clay, deep, strongly saline-alkali	68	IVw-6 (19)	79	------------	--	F	Silty Basin	100	9
WxD2	Wyman fine sandy loam, 8 to 15 percent slopes, eroded	68	IIIe-1 (19)	74	------------	--	A	Loamy	99	77
WyC2	Wyman loam, 2 to 8 percent slopes, eroded	68	IIe-1 (19)	73	------------	--	A	Loamy	99	86
YbC	Yokohl loam, 2 to 8 percent slopes	69	IVe-3 (19)	78	------------	--	D	Claypan	98	32
YbD2	Yokohl loam, 8 to 15 percent slopes, eroded	69	IVe-3 (19)	78	------------	--	D	Claypan	98	27
YbE3	Yokohl loam, 8 to 25 percent slopes, severely eroded	69	------------	--	VIe-8 (19)	81	D	Claypan	98	15
YkE2	Yokohl cobbly loam, 2 to 25 percent slopes, eroded	69	------------	--	VIe-7 (19)	80	D	Claypan	98	17

Map symbol	Mapping unit	Page	Capability unit: Irrigated Symbol	Irrigated Page	Dryland Symbol	Dryland Page	Vegetative soil group	Range site: Site	Range site: Page	Storie index rating: Number
YrD2	Ysidora very fine sandy loam, 2 to 15 percent slopes, eroded-------	70	IVe-8 (19)	78	------------	--	G	Loamy	99	44
YsC2	Ysidora gravelly very fine sandy loam, 2 to 8 percent slopes, eroded--------------------------	70	IIIe-8 (19)	75	------------	--	G	Loamy	99	39
YsE2	Ysidora gravelly very fine sandy loam, 8 to 25 percent slopes, eroded--------------------------	70	IVe-8 (19)	78	------------	--	G	Loamy	99	33
YsE3	Ysidora gravelly very fine sandy loam, 8 to 25 percent slopes, severely eroded-----------------	70	------------	--	VIIe-1 (19)	81	J	Shallow Loamy	99	21

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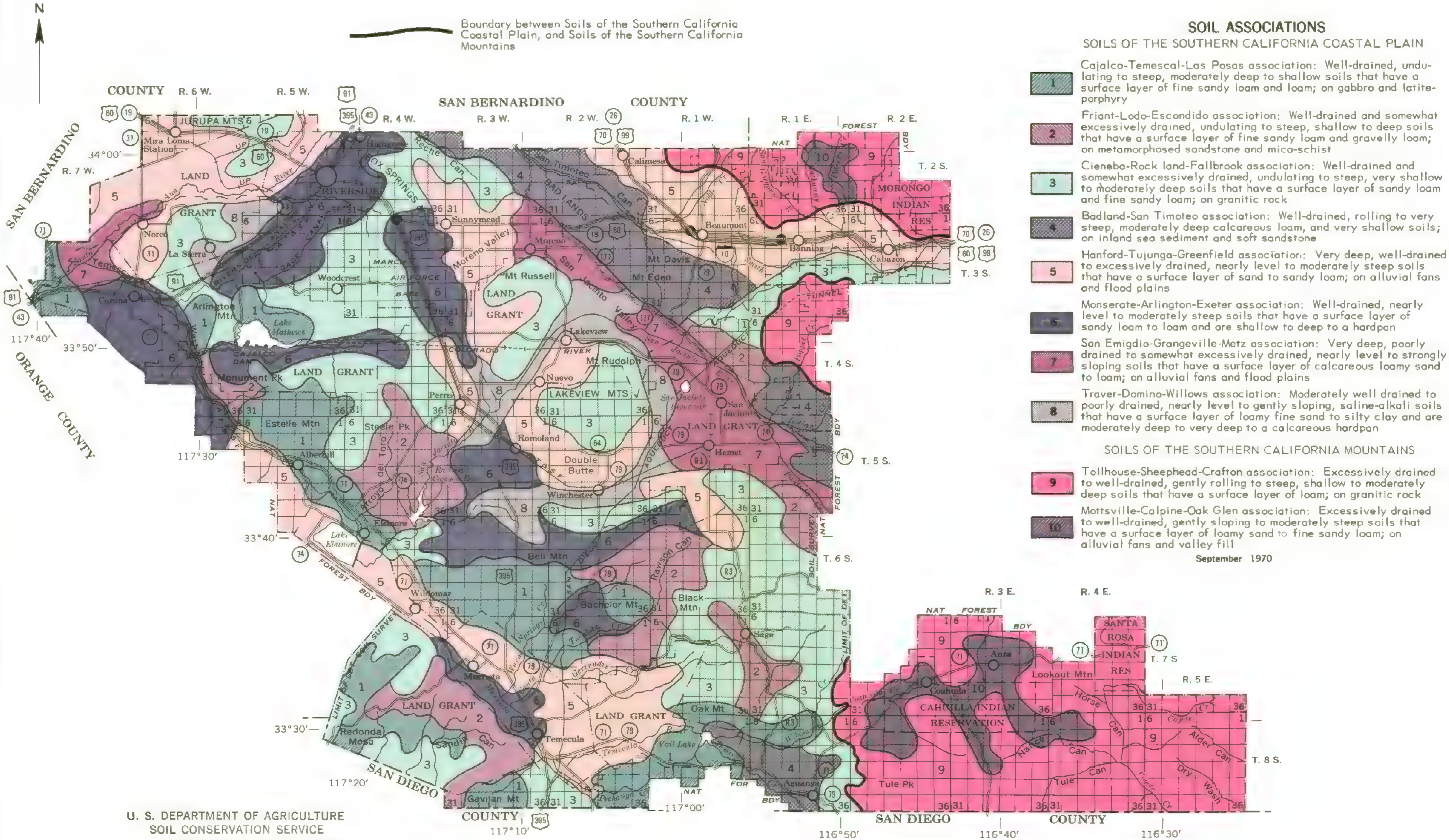


U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
UNIVERSITY OF CALIFORNIA AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

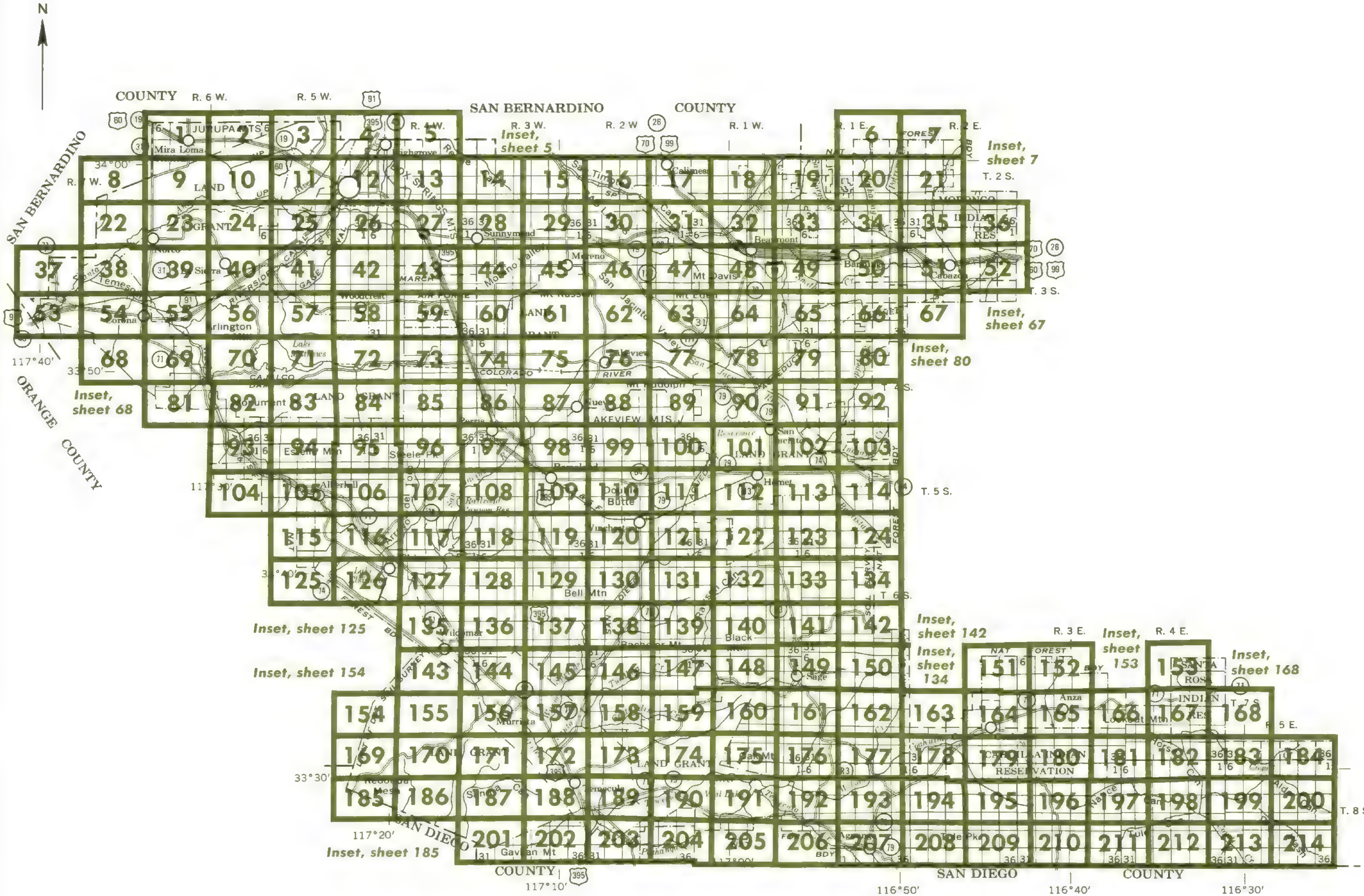
WESTERN RIVERSIDE AREA, CALIFORNIA

Scale 1:380,160

1 0 1 2 3 4 5 6 Miles

NOTE—

This map is intended for general planning. Each delineation may contain soils having ratings different from those shown on the map. Use detailed soil maps for operational planning.



Scale 1:380,160
1 0 1 2 3 4 5 6 Miles

INDEX TO MAP SHEETS
WESTERN RIVERSIDE AREA, CALIFORNIA

LOCATION OF PROFILES REPRESENTATIVE OF SOIL SERIES

SOIL SERIES	MAP SHEET	PART OF SHEET
Altamont	37	SW
Anza	168	NW
Arbuckle	55	SW
Arlington	26	SW
Auld	138	SW
Bishop	178	NE
Bonsall	42	SE
Bosanko	84	SW
Buchenau	25	NW
Bull Trail	178	SE
Buren	41	SW
Cajalco	83	SE
Calpine	197	NW
Chino	22	NW
Cieneba	56	NW
Cortina	68	NW
Crafton	20	SW
Crouch	66	NW
Delhi	1	SW
Dello	11	NE
Domino	86	NE
Escondido	158	NE
Exeter	74	SE
Fallbrook	59	NW
Friant	149	SW
Garretson	69	SW
Gaviota	53	NW
Gorgonio	50	NE
Grangeville	91	SW
Greenfield	46	SW
Hanford	62	NW
Hilmar	9	SW
Honcut	128	SE
Las Posas	159	NE
Lodo	117	NW
Madera	108	NE
Metz	103	SW
Monserate	28	SE
Mottsville	183	SW
Murrieta	170	SE
Oak Glen	19	SW
Pachappa	12	NW
Perkins	81	NW
Placentia	188	SE
Porterville	82	NE
Ramona	31	SE
San Emigdio	46	NE
San Timoteo	15	NE
Sheephead	166	NE
Soboba	90	NE
Soper	37	NW
Temescal	70	NW
Tollhouse	196	NE
Traver	89	SE
Tujunga	11	NE
Vallecitos	170	NE
Vallecitos, thick solum variant	108	NW
Visalia	203	SE
Vista	161	NE
Waukena	22	SW
Willows	97	NE
Wyman	111	SW
Yokohl	82	SE
Ysidora	187	NE

SOIL LEGEND

Each symbol consists of letters or a combination of letters and numbers. The first capital letter is the initial one of the soil name. A second capital letter, if used, shows the class of slope. Symbols without a slope letter are for nearly level soils. A final number, 2 or 3, in a symbol shows that the soil is named as eroded or severely eroded.

SYMBOL	NAME
AaD	Altamont clay, 5 to 15 percent slopes
AaE2	Altamont clay, 15 to 25 percent slopes, eroded
AaF	Altamont clay, 25 to 50 percent slopes
AbF	Altamont cobbly clay, 8 to 35 percent slopes
AcC	Anza fine sandy loam, 2 to 8 percent slopes
AdA	Anza loam, 0 to 2 percent slopes
AdC	Anza loam, 2 to 8 percent slopes
AkC	Arbuckle loam, 2 to 8 percent slopes
AkD	Arbuckle loam, 8 to 15 percent slopes
AlC	Arbuckle gravelly loam, 2 to 8 percent slopes
AlD	Arbuckle gravelly loam, 8 to 15 percent slopes
AlE	Arbuckle gravelly loam, 15 to 25 percent slopes
AlE3	Arbuckle gravelly loam, 2 to 25 percent slopes, severely eroded
AmC	Arbuckle gravelly clay loam, 2 to 8 percent slopes
AnC	Arlington fine sandy loam, 2 to 8 percent slopes
AnD	Arlington fine sandy loam, 8 to 15 percent slopes
AoA	Arlington fine sandy loam, deep, 0 to 2 percent slopes
AoC	Arlington fine sandy loam, deep, 2 to 8 percent slopes
AoD	Arlington fine sandy loam, deep, 8 to 15 percent slopes
ApB	Arlington loam, 2 to 5 percent slopes
ArB	Arlington loam, deep, 0 to 5 percent slopes
ArD	Arlington loam, deep, 5 to 15 percent slopes
AtC2	Arlington and Greenfield fine sandy loams, 2 to 8 percent slopes, eroded
AtD2	Arlington and Greenfield fine sandy loams, 8 to 15 percent slopes, eroded
AtF3	Arlington and Greenfield fine sandy loams, 15 to 35 percent slopes, severely eroded
AuC	Auld clay, 2 to 8 percent slopes
AuD	Auld clay, 8 to 15 percent slopes
AyF	Auld cobbly clay, 8 to 50 percent slopes
BaG	Badland
Bb	Bishop silt loam
BdC	Bonsall fine sandy loam, 2 to 8 percent slopes
BdD	Bonsall fine sandy loam, 8 to 15 percent slopes
BfC	Bosanko clay, 2 to 8 percent slopes
BfD	Bosanko clay, 8 to 15 percent slopes
BhA	Buchenau loam, slightly saline–alkali, 0 to 2 percent slopes
BhC	Buchenau loam, slightly saline–alkali, 2 to 8 percent slopes
BkC2	Buchenau silt loam, 2 to 8 percent slopes, eroded
BsC2	Bull Trail sandy loam, 5 to 8 percent slopes, eroded
BsD2	Bull Trail sandy loam, 8 to 15 percent slopes, eroded
BsE3	Bull Trail sandy loam, 8 to 25 percent slopes, severely eroded
BtD2	Bull Trail stony sandy loam, 8 to 15 percent slopes, eroded
BtE3	Bull Trail stony sandy loam, 8 to 25 percent slopes, severely eroded
BuC2	Buren fine sandy loam, 2 to 8 percent slopes, eroded
BuD2	Buren fine sandy loam, 8 to 15 percent slopes, eroded
BvD3	Buren loam, 5 to 15 percent slopes, severely eroded
BxC2	Buren loam, deep, 2 to 8 percent slopes, eroded
CaC2	Cajalco fine sandy loam, 2 to 8 percent slopes, eroded
CaD2	Cajalco fine sandy loam, 8 to 15 percent slopes, eroded
CaF2	Cajalco fine sandy loam, 15 to 35 percent slopes, eroded
CbD2	Cajalco rocky fine sandy loam, 5 to 15 percent slopes, eroded
CbF2	Cajalco rocky fine sandy loam, 15 to 50 percent slopes, eroded
CcC2	Calpine sandy loam, 2 to 8 percent slopes, eroded
CcD2	Calpine sandy loam, 8 to 15 percent slopes, eroded
CdC2	Calpine loam, 2 to 8 percent slopes, eroded
Ce	Chino silt loam, drained
Cf	Chino silt loam, drained, saline-alkali
Cg	Chino silt loam, strongly saline–alkali
CnC	Cieneba sandy loam, 5 to 8 percent slopes
CnD2	Cieneba sandy loam, 8 to 15 percent slopes, eroded
CnF2	Cieneba sandy loam, 15 to 50 percent slopes, eroded
CkD2	Cieneba rocky sandy loam, 8 to 15 percent slopes, eroded
CkF2	Cieneba rocky sandy loam, 15 to 50 percent slopes, eroded
ClC	Cortina gravelly loamy sand, 2 to 8 percent slopes
CmC	Cortina cobbly loamy sand, 2 to 8 percent slopes
CnC	Cortina gravelly coarse sandy loam, 2 to 8 percent slopes
CoA	Cortina sandy loam, 0 to 2 percent slopes
CpA	Cortina gravelly sandy loam, 0 to 2 percent slopes
CrD	Cortina cobbly sandy loam, 2 to 12 percent slopes
CsF2	Crafton rocky sandy loam, 25 to 50 percent slopes, eroded

Continued

SOIL LEGEND

Each symbol consists of letters or a combination of letters and numbers. The first capital letter is the initial one of the soil name. A second capital letter, if used, shows the class of slope. Symbols without a slope letter are for nearly level soils. A final number, 2 or 3, in a symbol shows that the soil is named as eroded or severely eroded.

SYMBOL	NAME
CtF2	Crafton fine sandy loam, 15 to 35 percent slopes, eroded
CuE	Crafton rocky fine sandy loam, 15 to 25 percent slopes
CvD2	Crouch loamy sand, 8 to 15 percent slopes, eroded
CwD2	Crouch sandy loam, 8 to 15 percent slopes, eroded
CwE2	Crouch sandy loam, 15 to 25 percent slopes, eroded
CyE2	Crouch rocky sandy loam, 8 to 25 percent slopes, eroded
CyF2	Crouch rocky sandy loam, 25 to 50 percent slopes, eroded
DaD2	Delhi fine sand, 2 to 15 percent slopes, wind-eroded
DbA	Delhi loamy fine sand, 0 to 2 percent slopes
DgB	Dello loamy sand, 0 to 5 percent slopes
DmA	Dello loamy sand, poorly drained, 0 to 2 percent slopes
DnB	Dello loamy sand, gravelly substratum, 0 to 5 percent slopes
DoA	Dello loamy fine sand, 0 to 2 percent slopes
DpB	Dello loamy fine sand, saline-alkali, 0 to 5 percent slopes
DrA	Dello loamy fine sand, gravelly substratum, 0 to 2 percent slopes
Ds2	Domino fine sandy loam, eroded
Dt	Domino fine sandy loam, saline-alkali
Du	Domino silt loam
Dv	Domino silt loam, saline-alkali
Dw	Domino silt loam, strongly saline-alkali
EcC2	Escondido fine sandy loam, 2 to 8 percent slopes, eroded
EcD2	Escondido fine sandy loam, 8 to 15 percent slopes, eroded
EcE2	Escondido fine sandy loam, 15 to 25 percent slopes, eroded
EfF2	Escondido rocky fine sandy loam, 8 to 50 percent slopes, eroded
EnA	Exeter sandy loam, 0 to 2 percent slopes
EnC2	Exeter sandy loam, 2 to 8 percent slopes, eroded
EoB	Exeter sandy loam, slightly saline alkali, 0 to 5 percent slopes
EpA	Exeter sandy loam, deep, 0 to 2 percent slopes
EpC2	Exeter sandy loam, deep, 2 to 8 percent slopes, eroded
EwB	Exeter very fine sandy loam, 0 to 5 percent slopes
EyB	Exeter very fine sandy loam, deep, 0 to 5 percent slopes
FaD2	Fallbrook sandy loam, 8 to 15 percent slopes, eroded
FaE2	Fallbrook sandy loam, 15 to 25 percent slopes, eroded
FbC2	Fallbrook sandy loam, shallow, 5 to 8 percent slopes, eroded
FbF2	Fallbrook sandy loam, shallow, 15 to 35 percent slopes, eroded
FcD2	Fallbrook rocky sandy loam, shallow, 8 to 15 percent slopes, eroded
FcF2	Fallbrook rocky sandy loam, shallow, 15 to 50 percent slopes, eroded
FfC2	Fallbrook fine sandy loam, 2 to 8 percent slopes, eroded
FkD2	Fallbrook fine sandy loam, shallow, 8 to 15 percent slopes, eroded
FwE2	Friant fine sandy loam, 5 to 25 percent slopes, eroded
FyE2	Friant rocky fine sandy loam, 8 to 25 percent slopes, eroded
FyF2	Friant rocky fine sandy loam, 25 to 50 percent slopes, eroded
GaA	Garretson very fine sandy loam, 0 to 2 percent slopes
GaC	Garretson very fine sandy loam, 2 to 8 percent slopes
GaD2	Garretson very fine sandy loam, 8 to 15 percent slopes, eroded
GcA	Garretson gravelly very fine sandy loam, 0 to 2 percent slopes
GdC	Garretson gravelly very fine sandy loam, 2 to 8 percent slopes
GdD2	Garretson gravelly very fine sandy loam, 8 to 15 percent slopes, eroded
GeG3	Gaviota rocky fine sandy loam, 25 to 75 percent slopes, severely eroded
GfF2	Gaviota very fine sandy loam, 15 to 50 percent slopes, eroded
GgF2	Gaviota rocky very fine sandy loam, 25 to 50 percent slopes, eroded
GhC	Gorgonio loamy sand, 0 to 8 percent slopes
GhD	Gorgonio loamy sand, 8 to 15 percent slopes
GkD	Gorgonio loamy sand, channeled, 2 to 15 percent slopes
GlC	Gorgonio loamy sand, deep, 2 to 8 percent slopes
GmD	Gorgonio gravelly loamy fine sand, 2 to 15 percent slopes
GnD	Gorgonio cobbly loamy fine sand, 2 to 15 percent slopes
GoB	Grangeville loamy fine sand, drained, 0 to 5 percent slopes
GpB	Grangeville sandy loam, drained, saline-alkali, 0 to 5 percent slopes
GrB	Grangeville sandy loam, sandy substratum, drained, 0 to 5 percent slopes
GsB	Grangeville sandy loam, sandy substratum, drained, saline-alkali, 0 to 5 percent slopes
GtA	Grangeville fine sandy loam, drained, 0 to 2 percent slopes
GtD	Grangeville fine sandy loam, drained, 5 to 15 percent slopes
GuB	Grangeville fine sandy loam, poorly drained, saline-alkali, 0 to 5 percent slopes
GvB	Grangeville fine sandy loam, saline-alkali, 0 to 5 percent slopes
GwA	Grangeville fine sandy loam, loamy substratum, drained, 0 to 2 percent slopes
GxA	Grangeville fine sandy loam, loamy substratum, drained, saline alkali, 0 to 2 percent slopes
GyA	Greenfield sandy loam, 0 to 2 percent slopes
GyC2	Greenfield sandy loam, 2 to 8 percent slopes, eroded
GyD2	Greenfield sandy loam, 8 to 15 percent slopes, eroded
GyE2	Greenfield sandy loam, 15 to 25 percent slopes, eroded
GzG	Gullied land
HaC	Hanford loamy fine sand, 0 to 8 percent slopes
HcA	Hanford coarse sandy loam, 0 to 2 percent slopes
HcC	Hanford coarse sandy loam, 2 to 8 percent slopes
HcD2	Hanford coarse sandy loam, 8 to 15 percent slopes, eroded
HdD2	Hanford cobbly coarse sandy loam, 2 to 15 percent slopes, eroded
HeC2	Hanford coarse sandy loam, deep, 2 to 8 percent slopes, eroded
HfD	Hanford sandy loam, 2 to 15 percent slopes
HgA	Hanford fine sandy loam, 0 to 2 percent slopes
HhA2	Hilmar loamy sand, 0 to 2 percent slopes, eroded
HlA	Hilmar loamy very fine sand, 0 to 2 percent slopes
HlC	Hilmar loamy very fine sand, 2 to 8 percent slopes
HnC	Honcut sandy loam, 2 to 8 percent slopes
HnD2	Honcut sandy loam, 8 to 15 percent slopes, eroded
HoE	Honcut cobbly sandy loam, 2 to 25 percent slopes
HuC2	Honcut loam, 2 to 8 percent slopes, eroded
LaC	Las Posas loam, 2 to 8 percent slopes
LaC2	Las Posas loam, 5 to 8 percent slopes, eroded
LaD2	Las Posas loam, 8 to 15 percent slopes, eroded
LaE3	Las Posas loam, 8 to 25 percent slopes, severely eroded
LcD2	Las Posas stony loam, 8 to 15 percent slopes, eroded
LkD2	Las Posas rocky loam, 8 to 15 percent slopes, eroded
LkF3	Las Posas rocky loam, 15 to 50 percent slopes, severely eroded
LoF2	Lodo gravelly loam, 15 to 50 percent slopes, eroded
LpE2	Lodo rocky loam, 8 to 25 percent slopes, eroded
LpF2	Lodo rocky loam, 25 to 50 percent slopes, eroded
MaA	Madera fine sandy loam, 0 to 2 percent slopes
MaB2	Madera fine sandy loam, 2 to 5 percent slopes, eroded
MaD2	Madera fine sandy loam, 5 to 15 percent slopes, eroded
MbC2	Madera fine sandy loam, shallow, 2 to 8 percent slopes, eroded
MdC	Metz loamy sand, 2 to 8 percent slopes
MeD	Metz loamy sand, channeled, 0 to 15 percent slopes
MfA	Metz loamy fine sand, 0 to 2 percent slopes
MgB	Metz loamy fine sand, gravelly sand substratum, 0 to 5 percent slopes
MhB	Metz loamy fine sand, sandy loam substratum, 0 to 5 percent slopes
MlD	Metz gravelly sandy loam, 2 to 15 percent slopes
MmB	Monserate sandy loam, 0 to 5 percent slopes
MmC2	Monserate sandy loam, 5 to 8 percent slopes, eroded
MmD2	Monserate sandy loam, 8 to 15 percent slopes, eroded
MmE3	Monserate sandy loam, 15 to 25 percent slopes, severely eroded
MnD2	Monserate sandy loam, shallow, 5 to 15 percent slopes, eroded
MnE3	Monserate sandy loam, shallow, 15 to 25 percent slopes, severely eroded
MoC	Mottsville loamy sand, 2 to 8 percent slopes
MoD	Mottsville loamy sand, 8 to 15 percent slopes
MrE	Mottsville cobbly loamy sand, 8 to 25 percent slopes
MsC	Mottsville sandy loam, 2 to 8 percent slopes
MsD	Mottsville sandy loam, 8 to 15 percent slopes
MtE2	Mottsville cobbly sandy loam, 8 to 25 percent slopes, eroded
MuE	Murrieta stony clay loam, 2 to 25 percent slopes
OgD	Oak Glen gravelly sandy loam, 8 to 15 percent slopes
OgE	Oak Glen gravelly sandy loam, 15 to 25 percent slopes
OkD	Oak Glen fine sandy loam, 5 to 15 percent slopes
PaA	Pachappa fine sandy loam, 0 to 2 percent slopes
PaC2	Pachappa fine sandy loam, 2 to 8 percent slopes, eroded
PeC	Perkins loam, 2 to 8 percent slopes
PgB	Perkins gravelly loam, 2 to 5 percent slopes
PgC	Perkins gravelly loam, 5 to 8 percent slopes
PgD2	Perkins gravelly loam, 8 to 15 percent slopes, eroded
PlB	Placentia fine sandy loam, 0 to 5 percent slopes
PlD	Placentia fine sandy loam, 5 to 15 percent slopes
PmE	Placentia cobbly fine sandy loam, 8 to 25 percent slopes
PoC	Porterville clay, 0 to 8 percent slopes
PrD	Porterville cobbly clay, 2 to 15 percent slopes
PsC	Porterville clay, moderately deep, 2 to 8 percent slopes
PtB	Porterville clay, moderately deep, slightly saline-alkali, 0 to 5 percent slopes
PvD2	Porterville gravelly clay, moderately deep, 2 to 15 percent slopes, eroded
RaA	Ramona sandy loam, 0 to 2 percent slopes
RaB2	Ramona sandy loam, 2 to 5 percent slopes, eroded
RaB3	Ramona sandy loam, 0 to 5 percent slopes, severely eroded
RaC2	Ramona sandy loam, 5 to 8 percent slopes, eroded
RaC3	Ramona sandy loam, 5 to 8 percent slopes, severely eroded
RaD2	Ramona sandy loam, 8 to 15 percent slopes, eroded
RaD3	Ramona sandy loam, 8 to 15 percent slopes, severely eroded
RaE3	Ramona sandy loam, 15 to 25 percent slopes, severely eroded
RdD2	Ramona sandy loam, moderately deep, 8 to 15 percent slopes, eroded
RdE3	Ramona sandy loam, moderately deep, 15 to 25 percent slopes, severely eroded
ReC2	Ramona very fine sandy loam, 0 to 8 percent slopes, eroded
RfC2	Ramona very fine sandy loam, moderately deep, 0 to 8 percent slopes, eroded
RmE3	Ramona and Buren sandy loams, 15 to 25 percent slopes, severely eroded
RnD2	Ramona and Buren loams, 5 to 15 percent slopes, eroded
RnE3	Ramona and Buren loams, 5 to 25 percent slopes, severely eroded
RsC	Riverwash
RtF	Rock land
RuF	Rough broken land
SdD	San Emigdio sandy loam, channeled, 2 to 15 percent slopes
SeA	San Emigdio fine sandy loam, 0 to 2 percent slopes
SeC2	San Emigdio fine sandy loam, 2 to 8 percent slopes, eroded
SeD2	San Emigdio fine sandy loam, 8 to 15 percent slopes, eroded
SfA	San Emigdio fine sandy loam, deep, 0 to 2 percent slopes
SgA	San Emigdio loam, 0 to 2 percent slopes
SgC	San Emigdio loam, 2 to 8 percent slopes
SgD2	San Emigdio loam, 8 to 15 percent slopes, eroded
SmE2	San Timoteo loam, 8 to 25 percent slopes, eroded
SmF2	San Timoteo loam, 25 to 50 percent slopes, eroded
SnD2	Sheephead fine sandy loam, 8 to 15 percent slopes, eroded
SpG2	Sheephead rocky fine sandy loam, 15 to 75 percent slopes, eroded
SrE	Soboba cobbly loamy sand, 2 to 25 percent slopes
SsD	Soboba stony loamy sand, 2 to 15 percent slopes
StF2	Soper loam, 15 to 35 percent slopes, eroded
SuF2	Soper cobbly loam, 25 to 50 percent slopes, eroded
TaF2	Temescal loam, 15 to 50 percent slopes, eroded
TbF2	Temescal rocky loam, 15 to 50 percent slopes, eroded
TeG	Terrace escarpments
TfF2	Tollhouse rocky coarse sandy loam, 8 to 50 percent slopes, eroded
ThD2	Tollhouse sandy loam, 5 to 15 percent slopes, eroded
ThE2	Tollhouse sandy loam, 15 to 25 percent slopes, eroded
Tp2	Traver loamy fine sand, eroded
Tr2	Traver loamy fine sand, saline-alkali, eroded
Ts	Traver fine sandy loam, saline-alkali
Tt2	Traver fine sandy loam, strongly saline alkali, eroded
TuB	Tujunga loamy sand, 0 to 5 percent slopes
TvC	Tujunga loamy sand, channeled, 0 to 8 percent slopes
TwC	Tujunga gravelly loamy sand, 0 to 8 percent slopes
VaE3	Vallecitos loam, 8 to 25 percent slopes, severely eroded
VdF2	Vallecitos rocky loam, 8 to 50 percent slopes, eroded
VeC2	Vallecitos loam, thick solum variant, 2 to 8 percent slopes, eroded
VeD2	Vallecitos loam, thick solum variant, 8 to 15 percent slopes, eroded
VeF2	Vallecitos loam, thick solum variant, 15 to 50 percent slopes, eroded
VlC2	Visalia sandy loam, 0 to 8 percent slopes, eroded
VmA	Visalia fine sandy loam, 0 to 2 percent slopes
VmC	Visalia fine sandy loam, 2 to 8 percent slopes
VsC	Vista coarse sandy loam, 2 to 8 percent slopes
VsD2	Vista coarse sandy loam, 8 to 15 percent slopes, eroded
VsF2	Vista coarse sandy loam, 15 to 35 percent slopes, eroded
VtF2	Vista rocky coarse sandy loam, 2 to 35 percent slopes, eroded
Wa	Waukena loamy fine sand, saline-alkali
Wb	Waukena fine sandy loam, saline-alkali
Wc	Waukena fine sandy loam, strongly saline-alkali
Wd	Waukena loam, saline-alkali
WeD	Wet alluvial land
Wf	Willows silty clay
Wg	Willows silty clay, saline-alkali
Wh	Willows silty clay, strongly saline-alkali
Wm	Willows silty clay, deep, saline-alkali
Wn	Willows silty clay, deep, strongly saline-alkali
WxD2	Wyman fine sandy loam, 8 to 15 percent slopes, eroded
WyC2	Wyman loam, 2 to 8 percent slopes, eroded
YbC	Yokohl loam, 2 to 8 percent slopes
YbD2	Yokohl loam, 8 to 15 percent slopes, eroded
YbE3	Yokohl loam, 8 to 25 percent slopes, severely eroded
YkE2	Yokohl cobbly loam, 2 to 25 percent slopes, eroded
YrD2	Ysidora very fine sandy loam, 2 to 15 percent slopes, eroded
YsC2	Ysidora gravelly very fine sandy loam, 2 to 8 percent slopes, eroded
YsE2	Ysidora gravelly very fine sandy loam, 8 to 25 percent slopes, eroded
YsE3	Ysidora gravelly very fine sandy loam, 8 to 25 percent slopes, severely eroded

Soil map constructed 1968 by Cartographic Division, Soil Conservation Service, USDA, from 1954, 1959 and 1961 aerial photographs. Controlled mosaic based on California plane coordinate system, sixth zone, Lambert conformal conic projection, 1927 North American datum.

WESTERN RIVERSIDE AREA, CALIFORNIA

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Dual
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State or county

Railroads
- Single track
- Multiple track
- In road or street

Bridges and crossings
- Road
- Trail
- Railroad
- Ferry — FY
- Ford — FORD
- Grade
- R. R. over
- R. R. under

Tunnel

Buildings
- School
- Church

Mine and quarry

Gravel pit

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

Forest fire or lookout station

Windmill

BOUNDARIES

- National or state
- County
- Area boundry
- Reservation
- Land grant
- Small park, cemetery, airport
- Land survey division corners

DRAINAGE

Streams, double-line
- Perennial
- Intermittent

Streams, single-line
- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
  - Unclassified

Canals and ditches — CANAL

Lakes and ponds
- Perennial — water, w
- Intermittent — int

Spring

Marsh or swamp

Wet spot

Alluvial fan

Drainage end

Flume

Aqueduct

RELIEF

Escarpments
- Bedrock
- Other

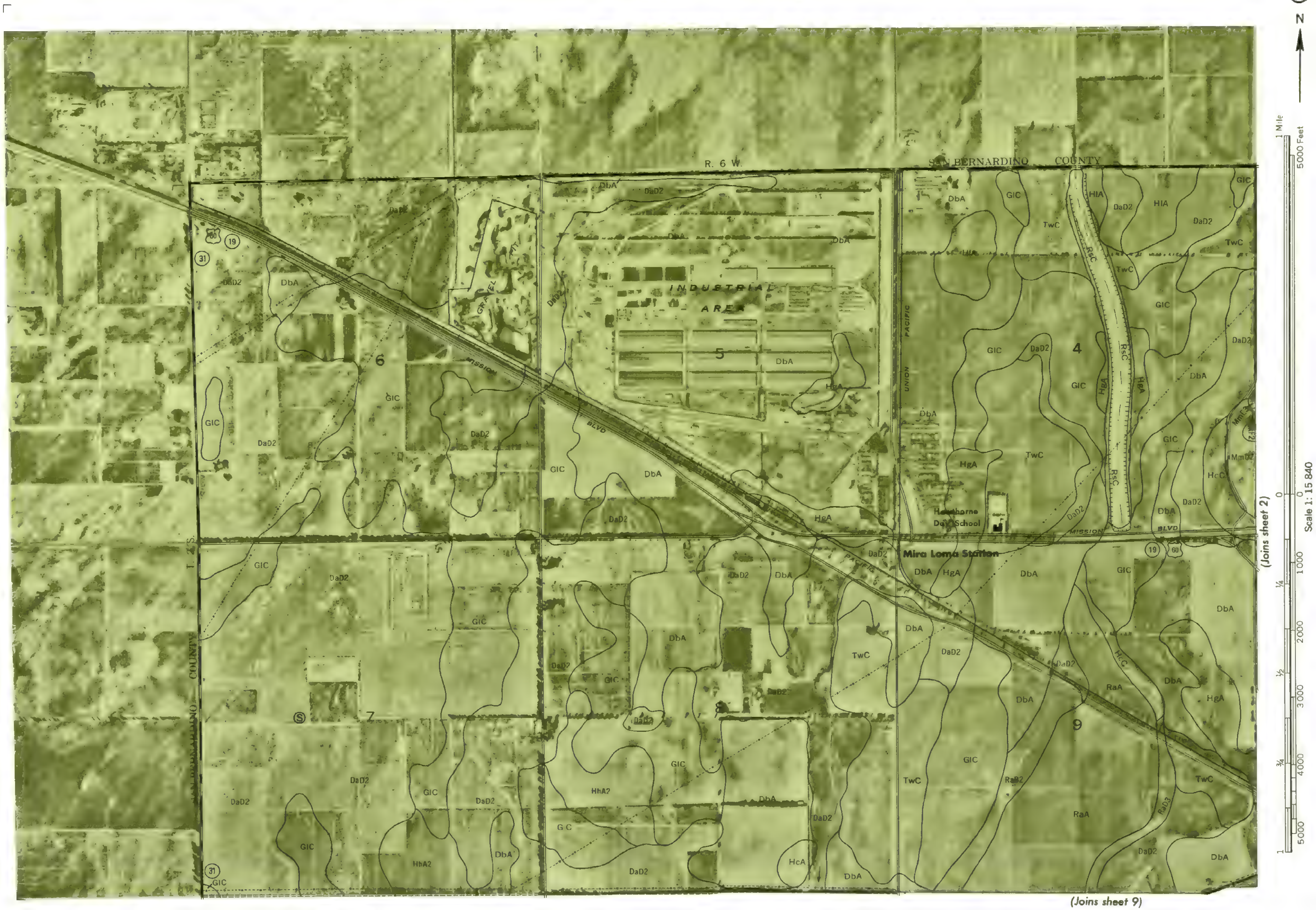
Prominent peak

SOIL SURVEY DATA

- Soil boundary and symbol — Dx
- Site of profile representative of soil series
- Gravel
- Stoniness
  - Stony
  - Very stony
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Sand wash — S.W.
- Sand dunes — S.D.
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gully
- Short steep slope
- Saline spot
- Terrace remmants, 0.2 to 2.5 acres
- Flat tops on terraces and in residual soils surrounded by an escarpment or steep mapping unit
- Area of shallow to moderately deep soils underlain by duripan, 0.2 to 2.5 acres

PRADO FLOOD CONTROL BASIN

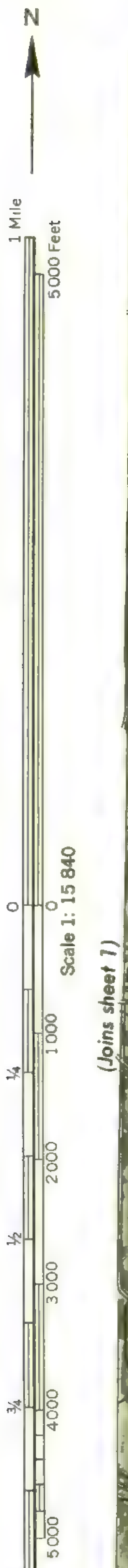
Area of the reservoir is overprinted with black fine diagonal lines. The shoreline is shown as a black dashed line.



This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

(2)



(9) | (Joins sheet 10)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 2

Land division corners are approximately positioned on this map.

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3

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 3

Land division corners are approximately positioned on this map.

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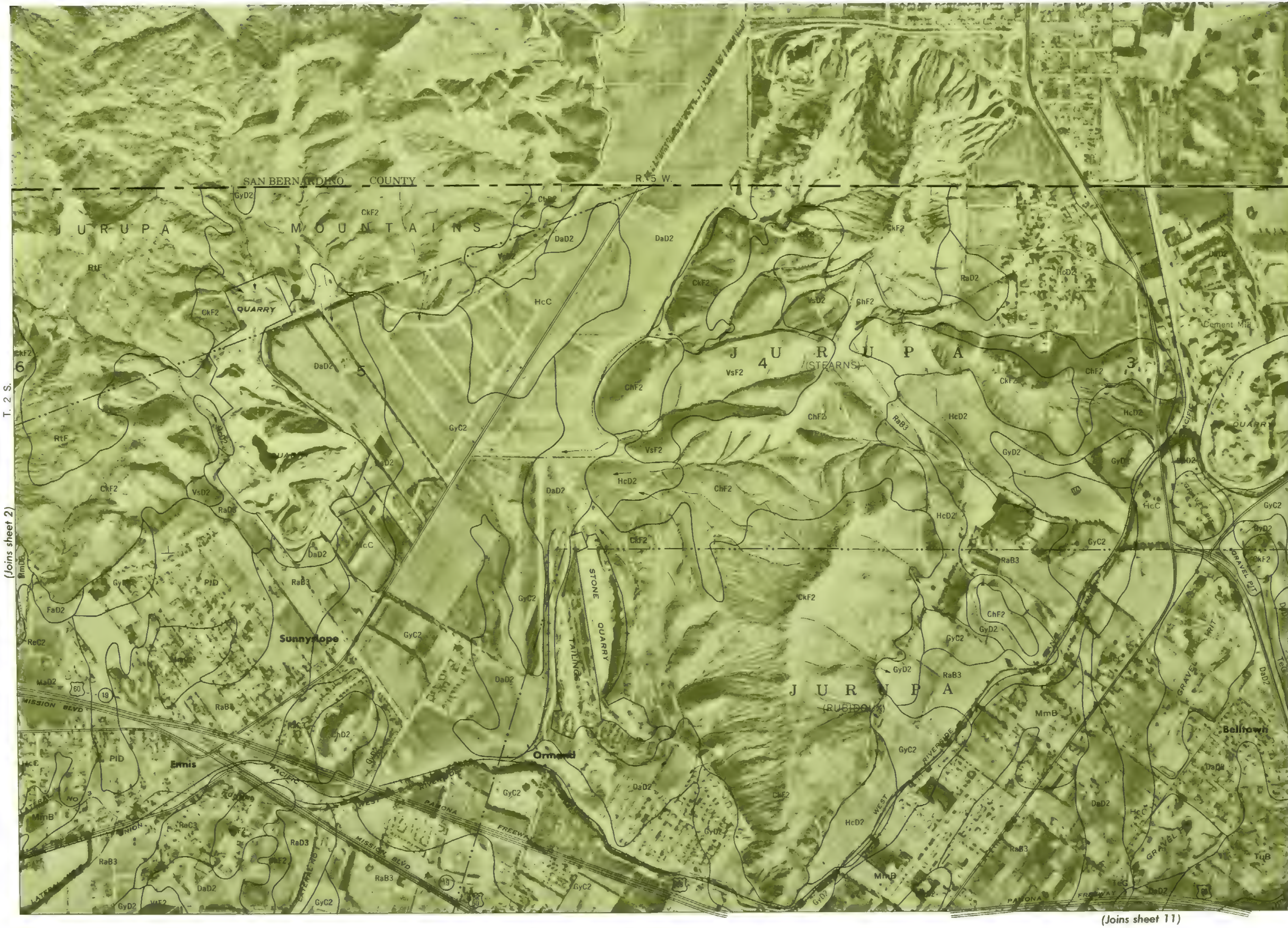

N

1 Mile
5000 Feet
Scale 1: 15 840
0 1/4 1/2 3/4 1
0 1000 2000 3000 4000 5000

4

N

1 Mile

5000 Feet

Scale 1: 15 840

(Joins sheet 3)

(Joins sheet 12)

(Joins sheet 5)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 4

Land division corners are approximately positioned on this map.

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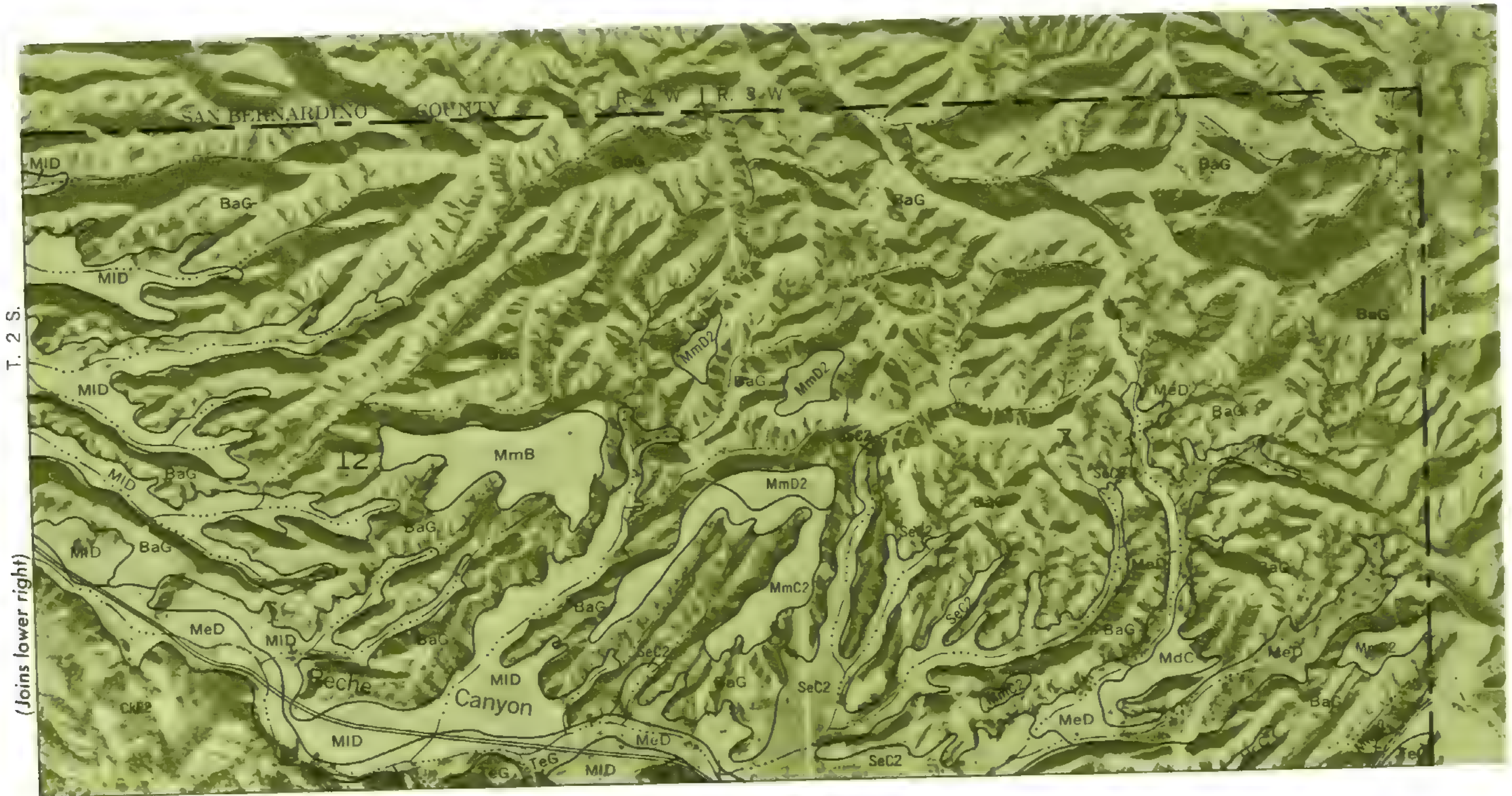
N

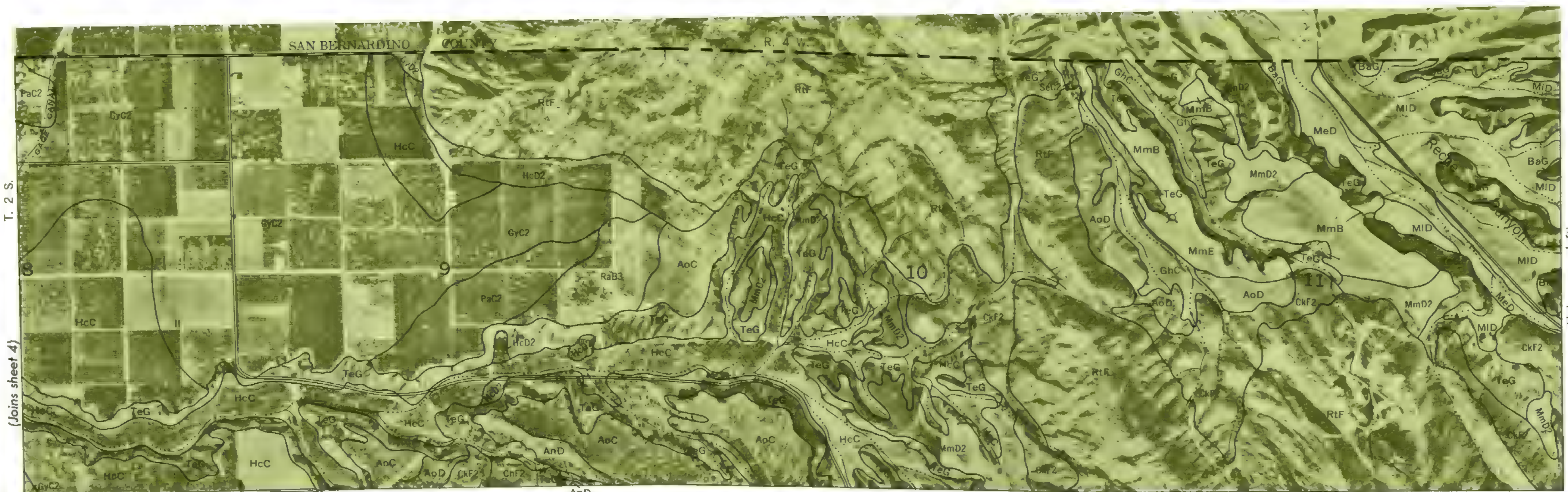
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 5



(Joins sheet 14)



AnD

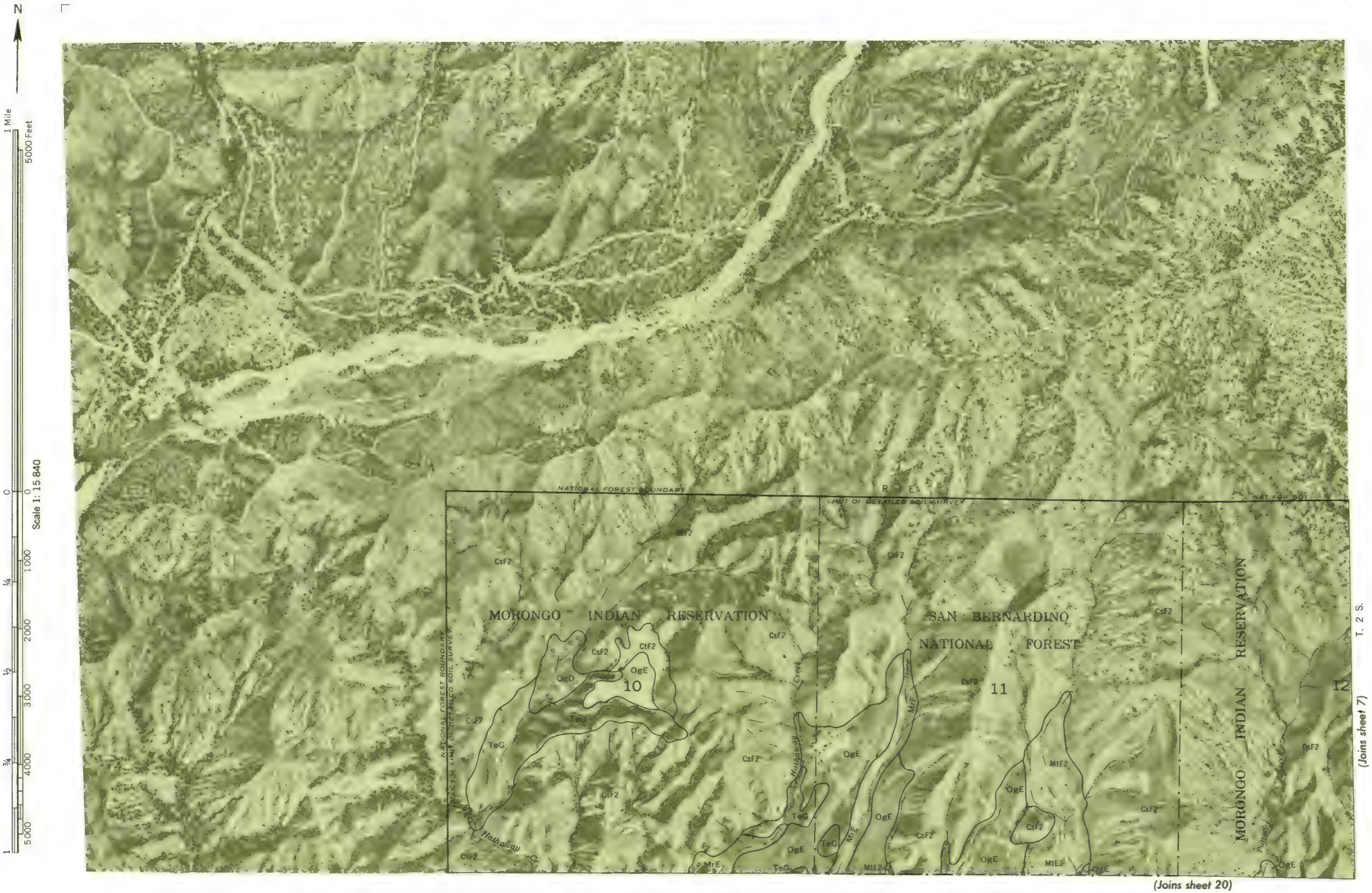
(Joins upper left)

(Joins sheet 13)

1 Mile ¾ ½ ¼ 0

5000 Feet 4000 3000 2000 1000 0 5000

Scale 1: 15 840



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 6

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

7

N

Scale 1: 15 840

1 Mile

5000 Feet

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 7

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

8

N

1 Mile 5000 Feet

Scale 1: 15 840

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

(Joins sheet 9)

(Joins sheet 22)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 8

Land division corners are approximately positioned on this map.

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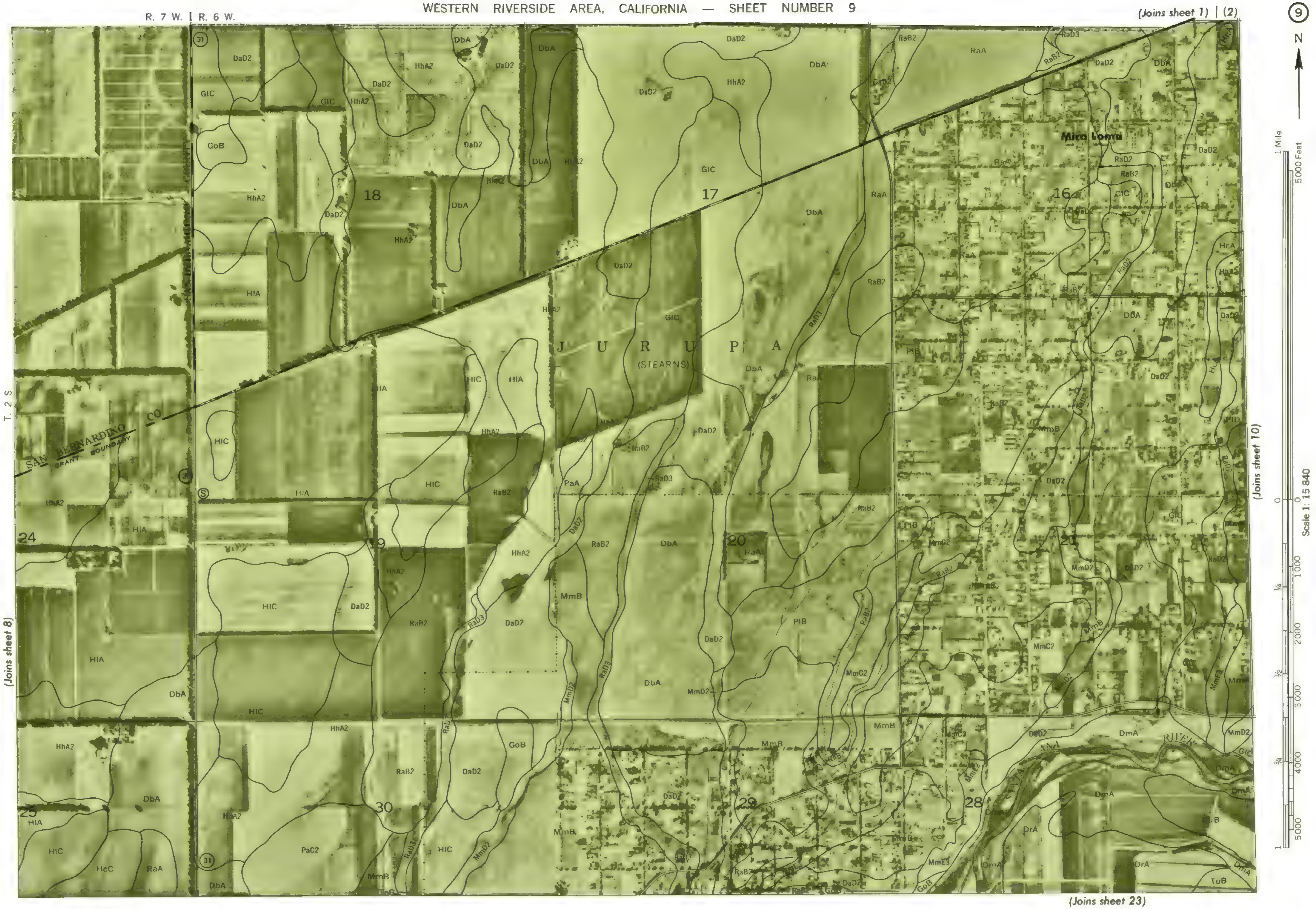

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 9

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 10

Land division corners are approximately positioned on this map.

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WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 11

(11)

N

Scale 1: 15 840

1 Mile | ¾ | ½ | ¼ | 0

5000 Feet | 4000 | 3000 | 2000 | 1000 | 0

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 11

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 12

Land division corners are approximately positioned on this map.

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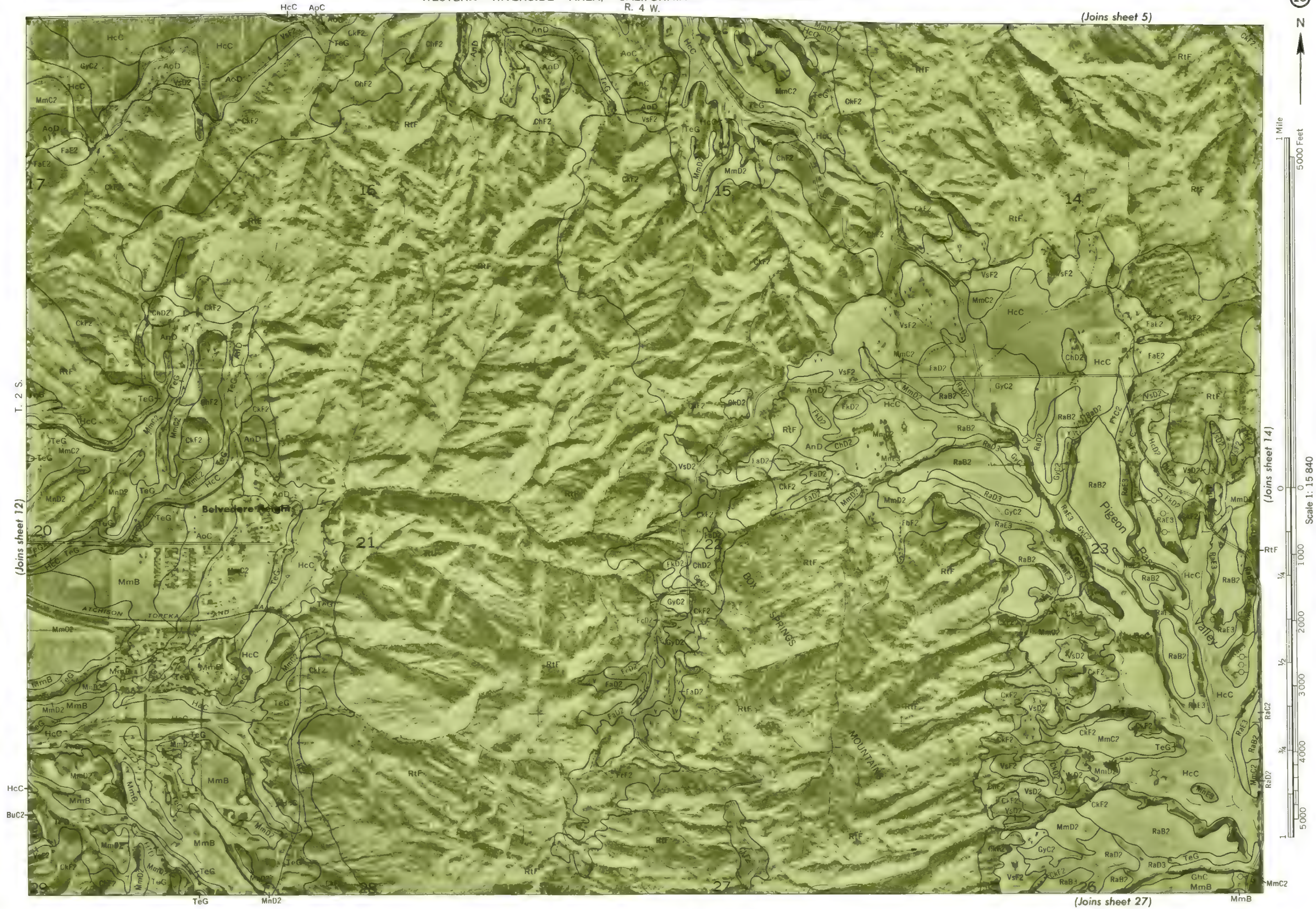
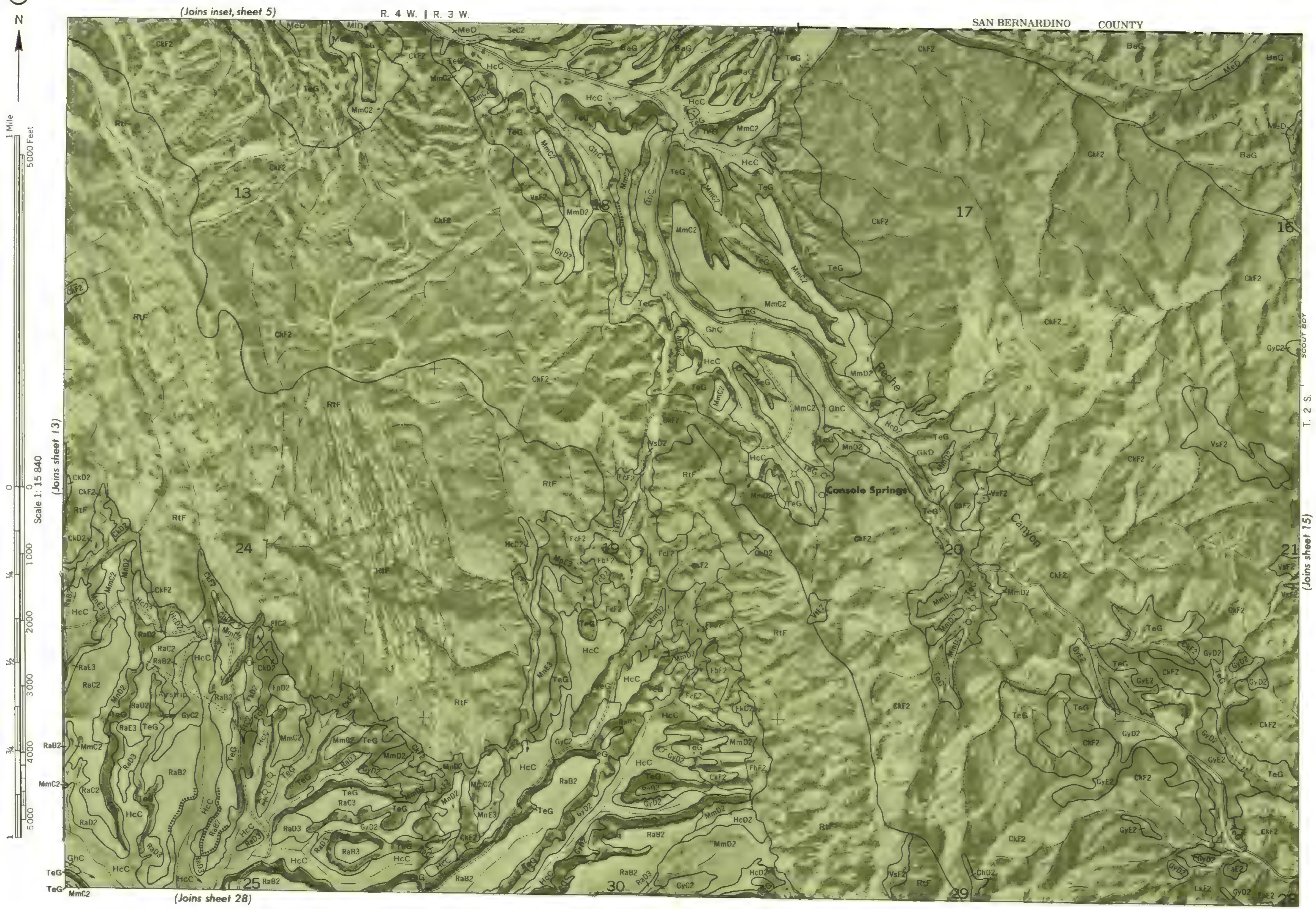
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station
Land division corners are approximately positioned on this map
WESTERN RIVERSIDE AREA, CALIFORNIA NO. 13





WESTERN RIVERSIDE AREA, CALIFORNIA NO. 14

Land division corners are approximately positioned on this map.

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15

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

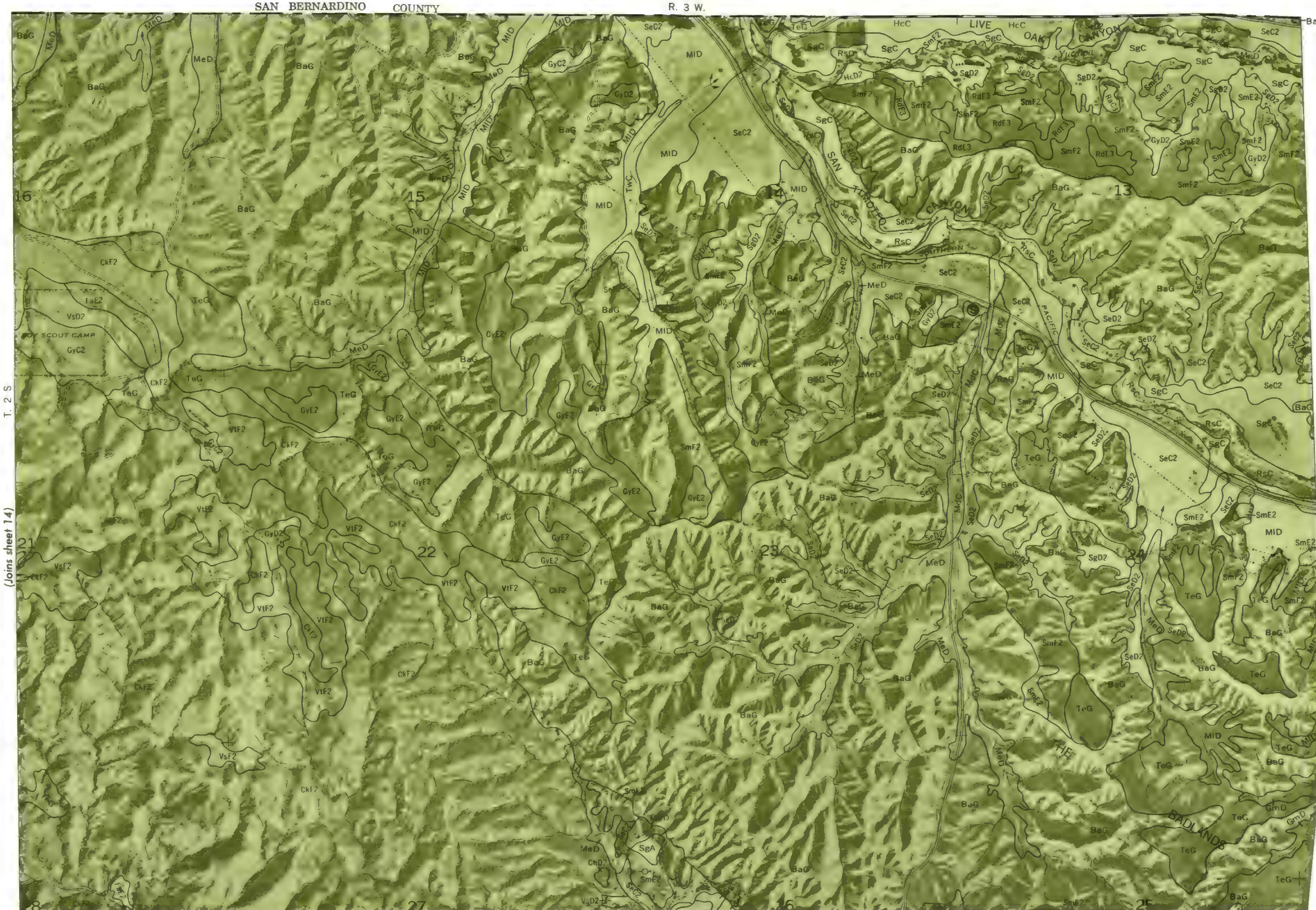
Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 15

SAN BERNARDINO COUNTY

R. 3 W.

T. 2 S



N

1 Mile

5000 Feet

0

1000

¼

2000

½

3000

¾

4000

5000

1

Scale 1:15 840

N

Scale 1: 15 840

1 Mile

5000 Feet

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 16

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

Land division corners are approximately positioned on this map

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 17

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 18

R. 1 W.

SAN BERNARDINO COUNTY

N

Scale 1: 15 840

1 Mile

5000 Feet

(Joins sheet 17)

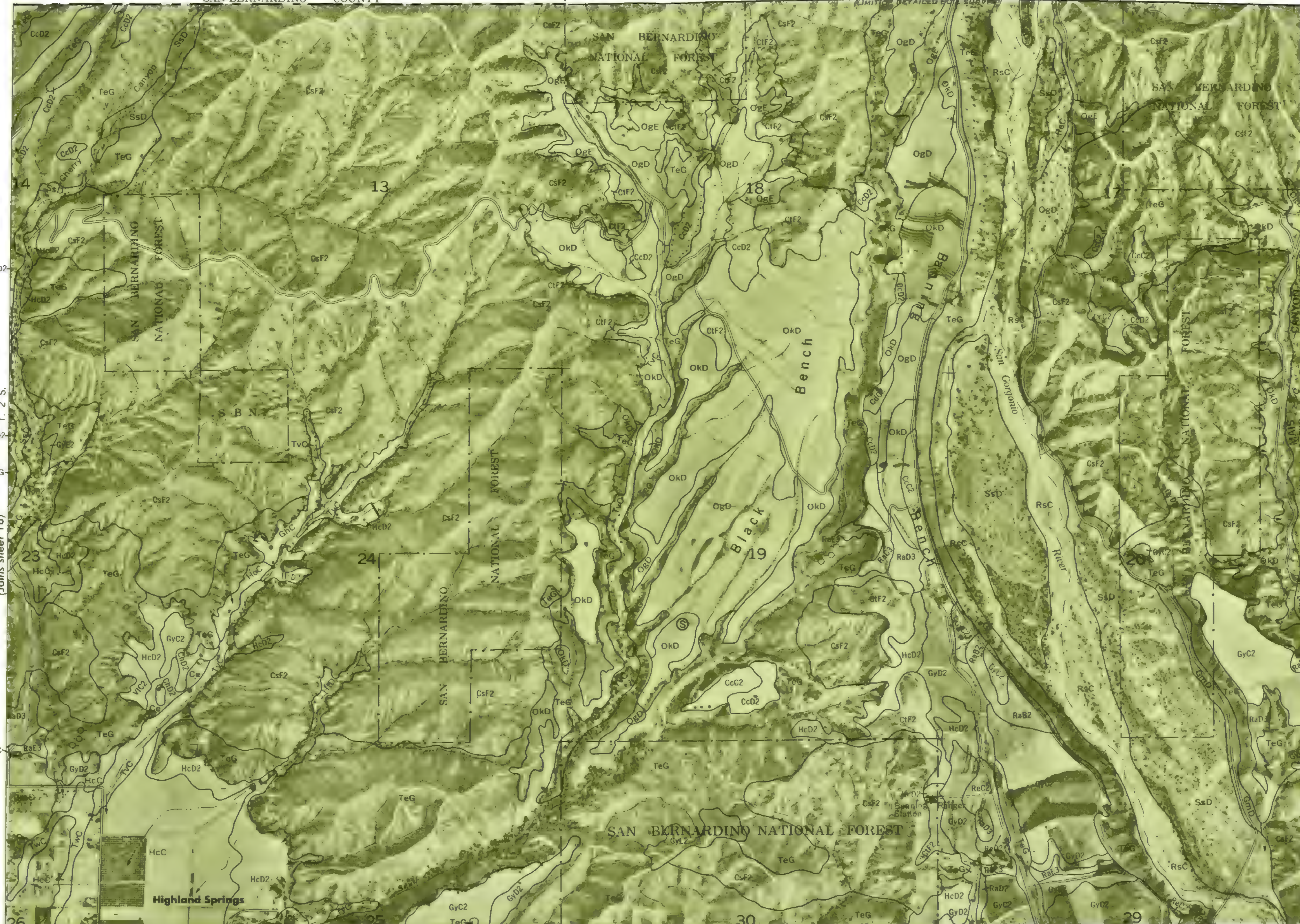
(Joins sheet 19)

(Joins sheet 32)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 18

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station



(Joins sheet 18)

(Joins sheet 20)

(Joins sheet 33)

N

1 Mile

5000 Feet

Scale 1:15 840

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 20

N

Scale 1: 15 840

1 Mile

5000 Feet

R. 1 E.

(Joins sheet 6)

(Joins sheet 19)

T. 2 S.

(Joins sheet 21)

(Joins sheet 34)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 20

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 21

(Joins sheet 8)

(Joins sheet 38)

22

N

Scale 1: 15 840

1 Mile

5000 Feet

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 22

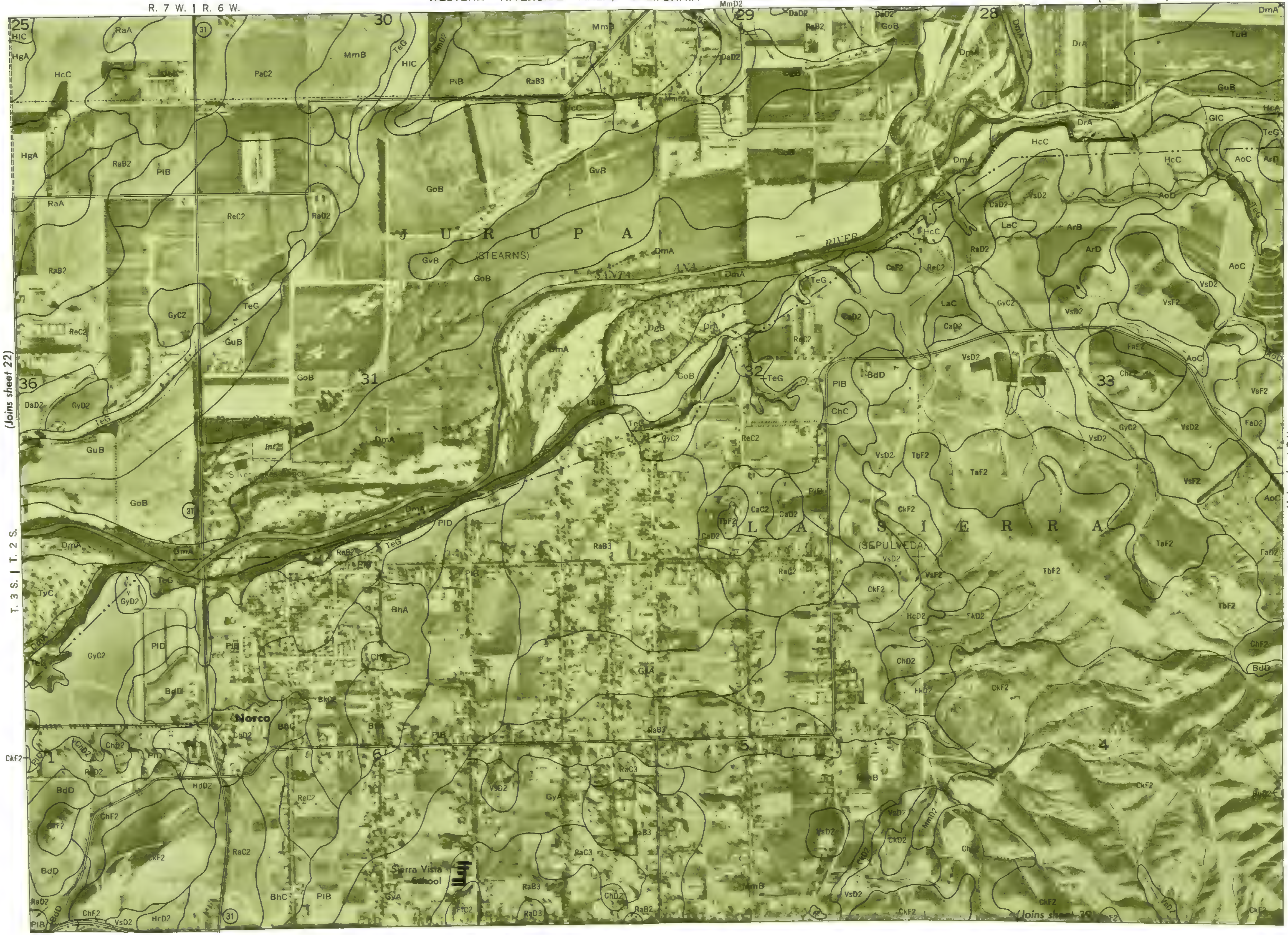
Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 23



N

1 Mile

5000 Feet

Scale 1: 15 840

(24)

(Joins sheet 10)

N

Scale 1: 15 840

1 Mile — 5000 Feet

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 24

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.
Land division corners are approximately positioned on this map.

26

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 26

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 27

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 28

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 29

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 29

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 30

R. 2 W.

(Joins sheet 16)

N

1 Mile

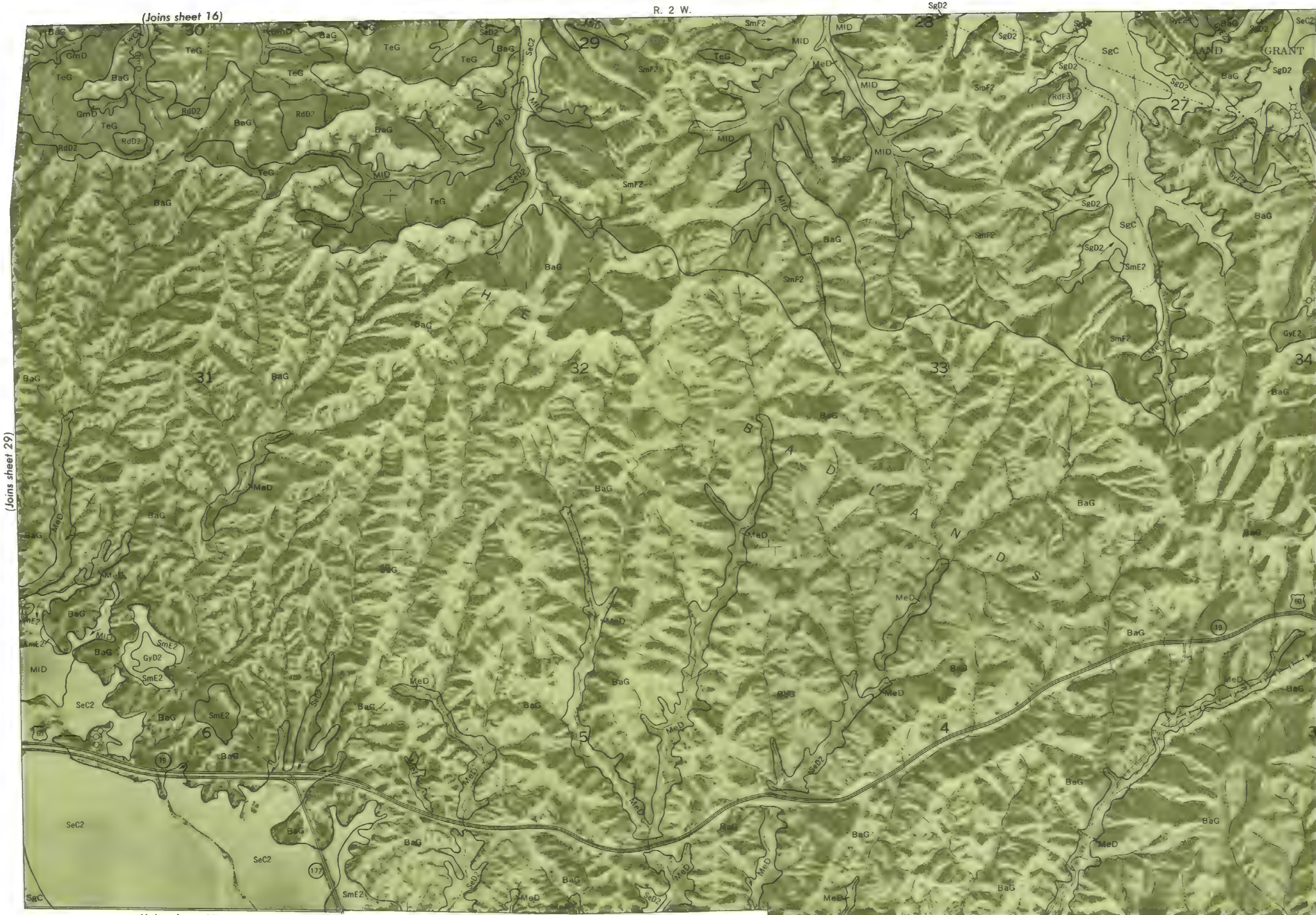
5000 Feet

Scale 1: 15 840

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

(Joins sheet 29)



T. 2 S.
T. 3 S.

(Joins sheet 31)

(Joins sheet 46)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 30

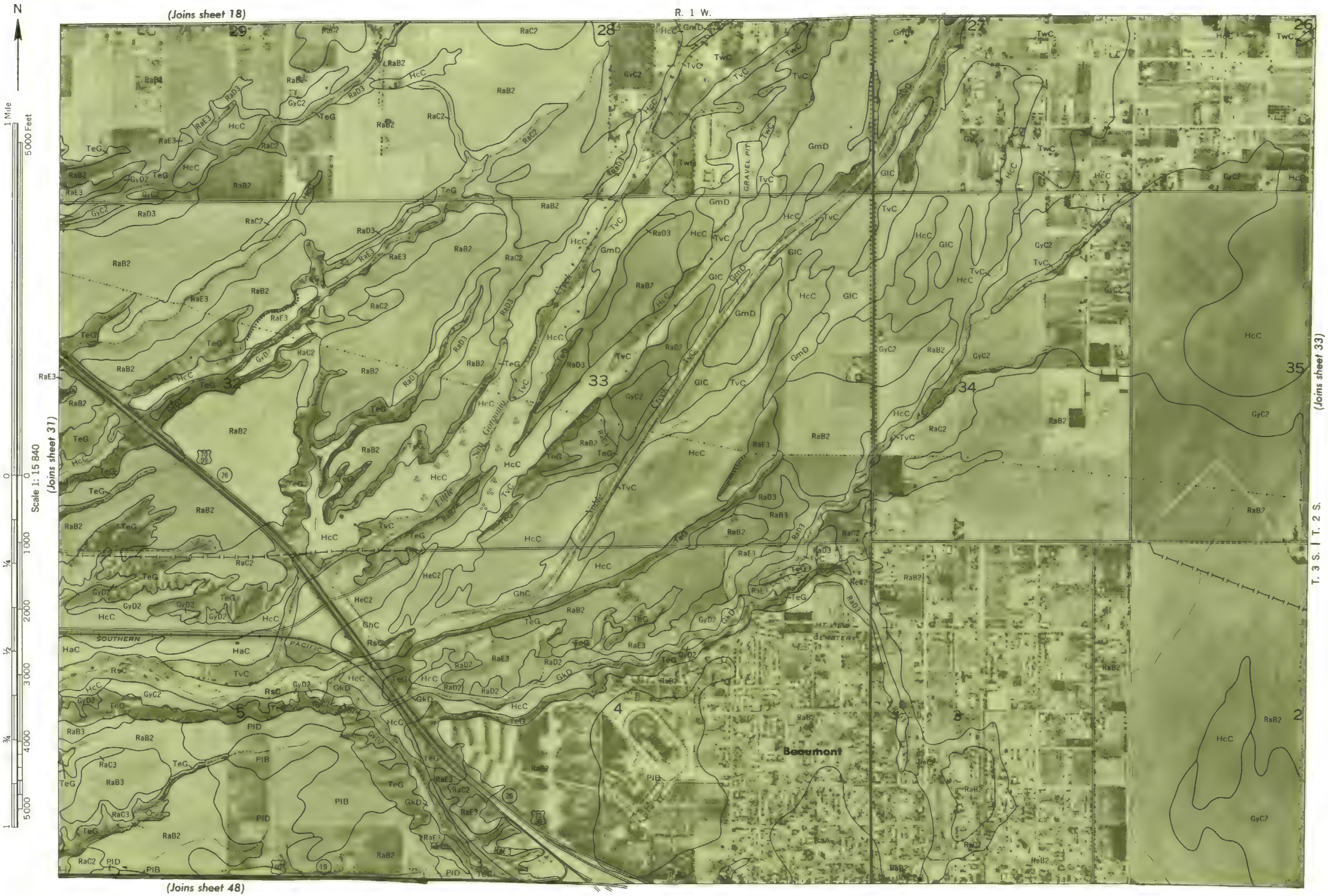
Land division corners are approximately positioned on this map

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

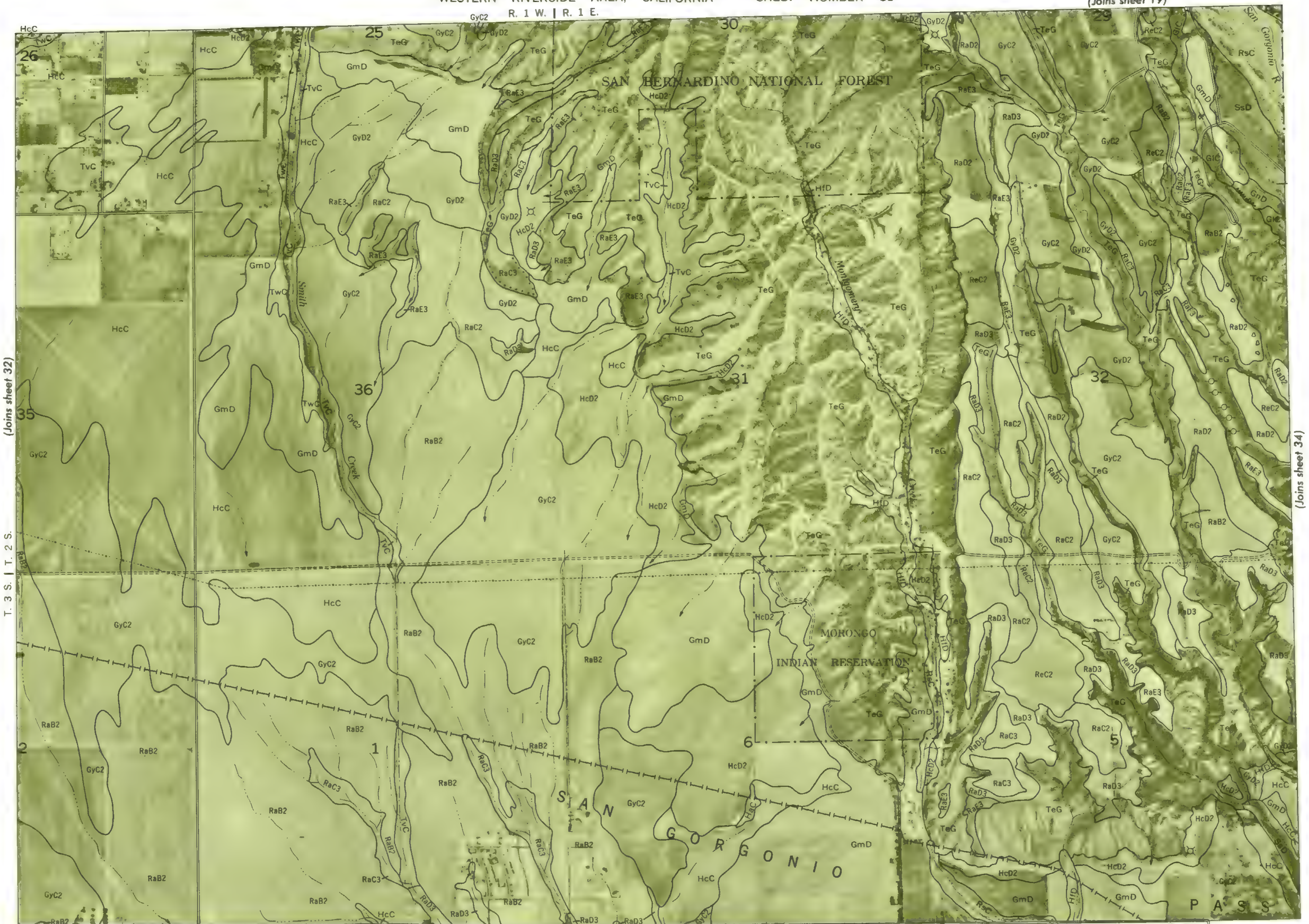
WESTERN RIVERSIDE AREA, CALIFORNIA NO. 31



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 32

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station



(33)

N

Scale 1: 15 840

1 Mile

5000 Feet

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 33

(Joins sheet 20)

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 34

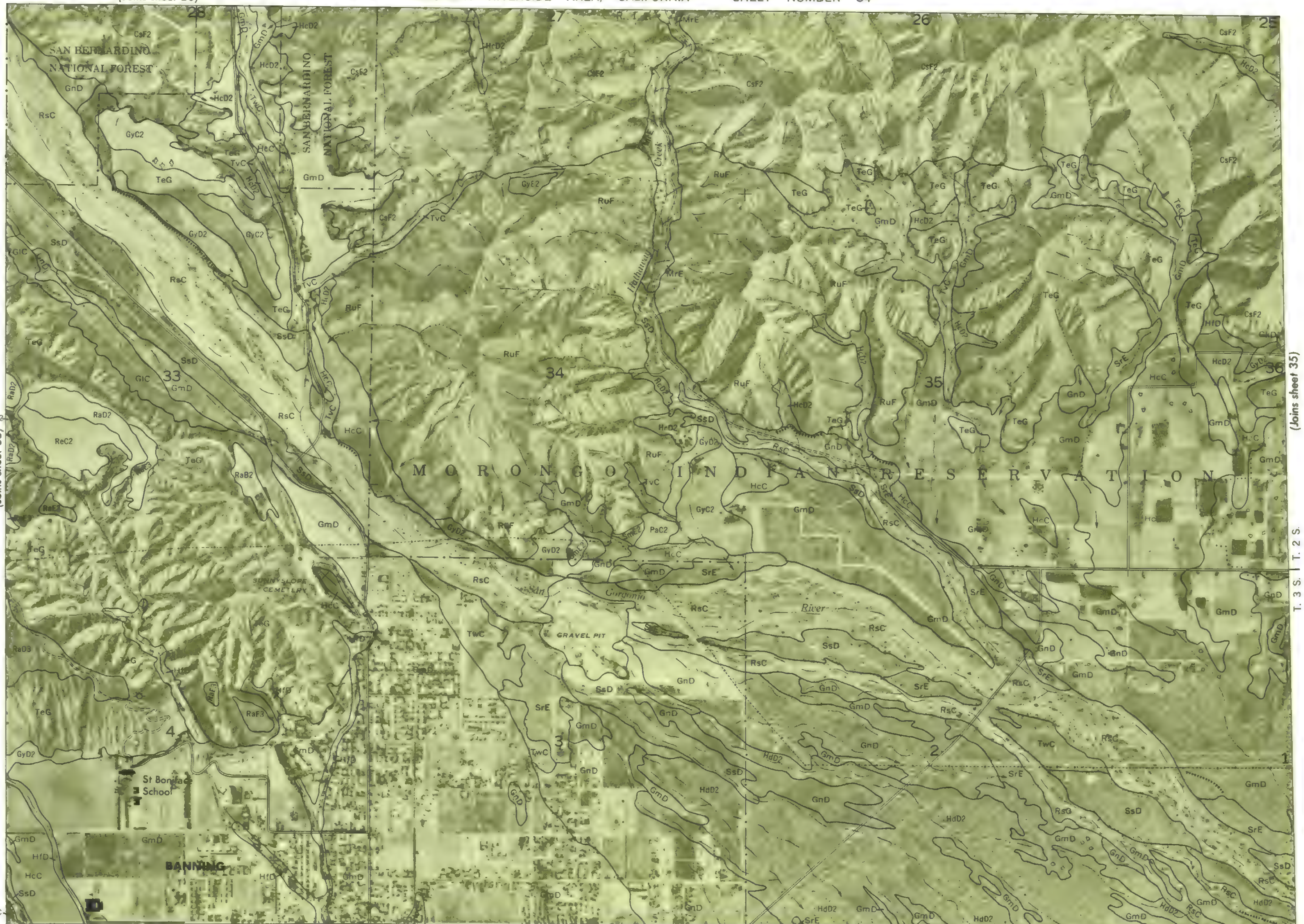
N

Scale 1: 15 840

1 Mile

5000 Feet

(Joins sheet 33)



(Joins sheet 35)

(Joins sheet 50)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 34

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

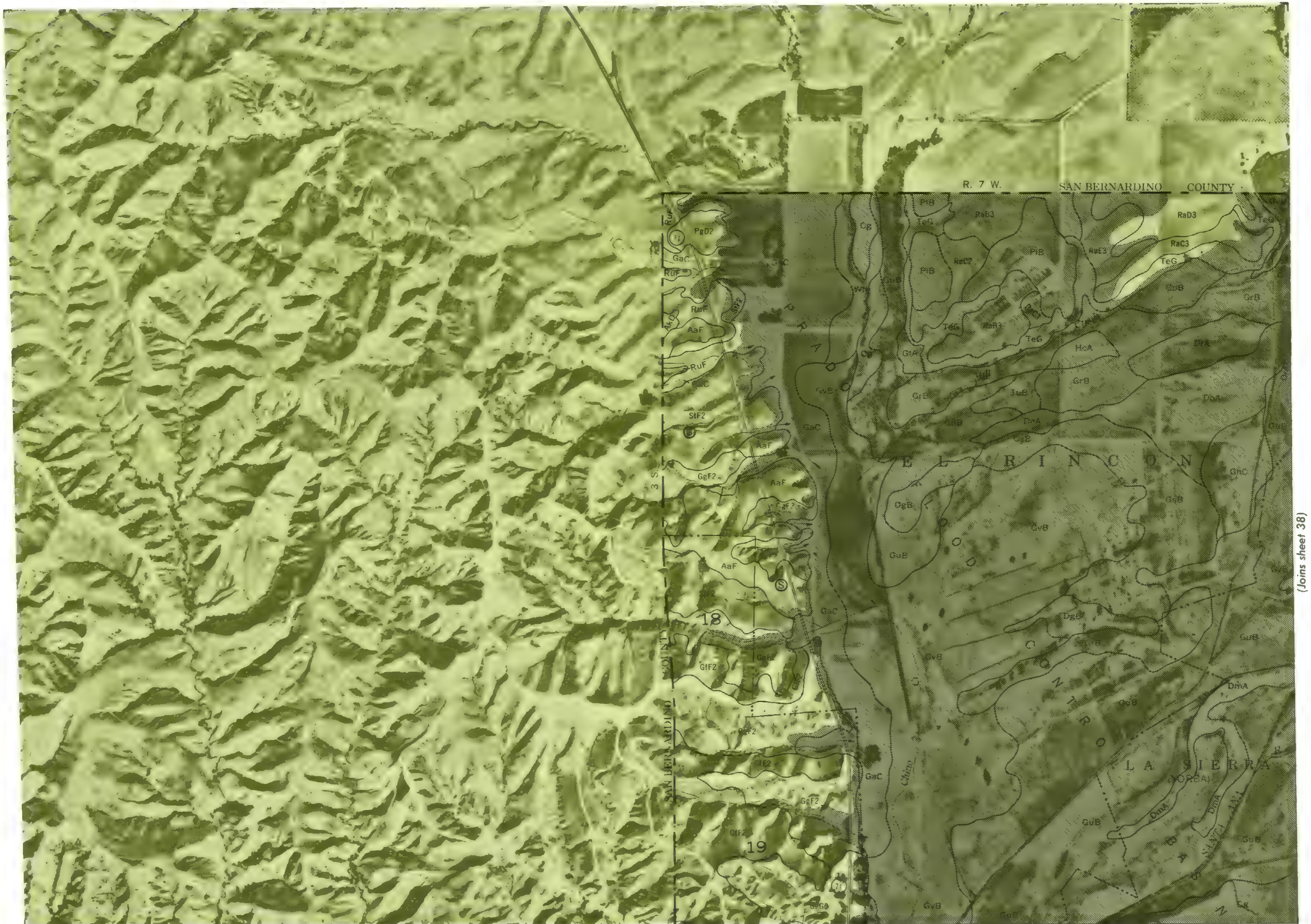
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 35

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 36
Land division corners are approximately positioned on this map.
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

37



(Joins sheet 38)

(Joins sheet 53)

N

1 Mile

5000 Feet

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

Scale 1: 15 840

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 37

N

1 Mile
5000 Feet

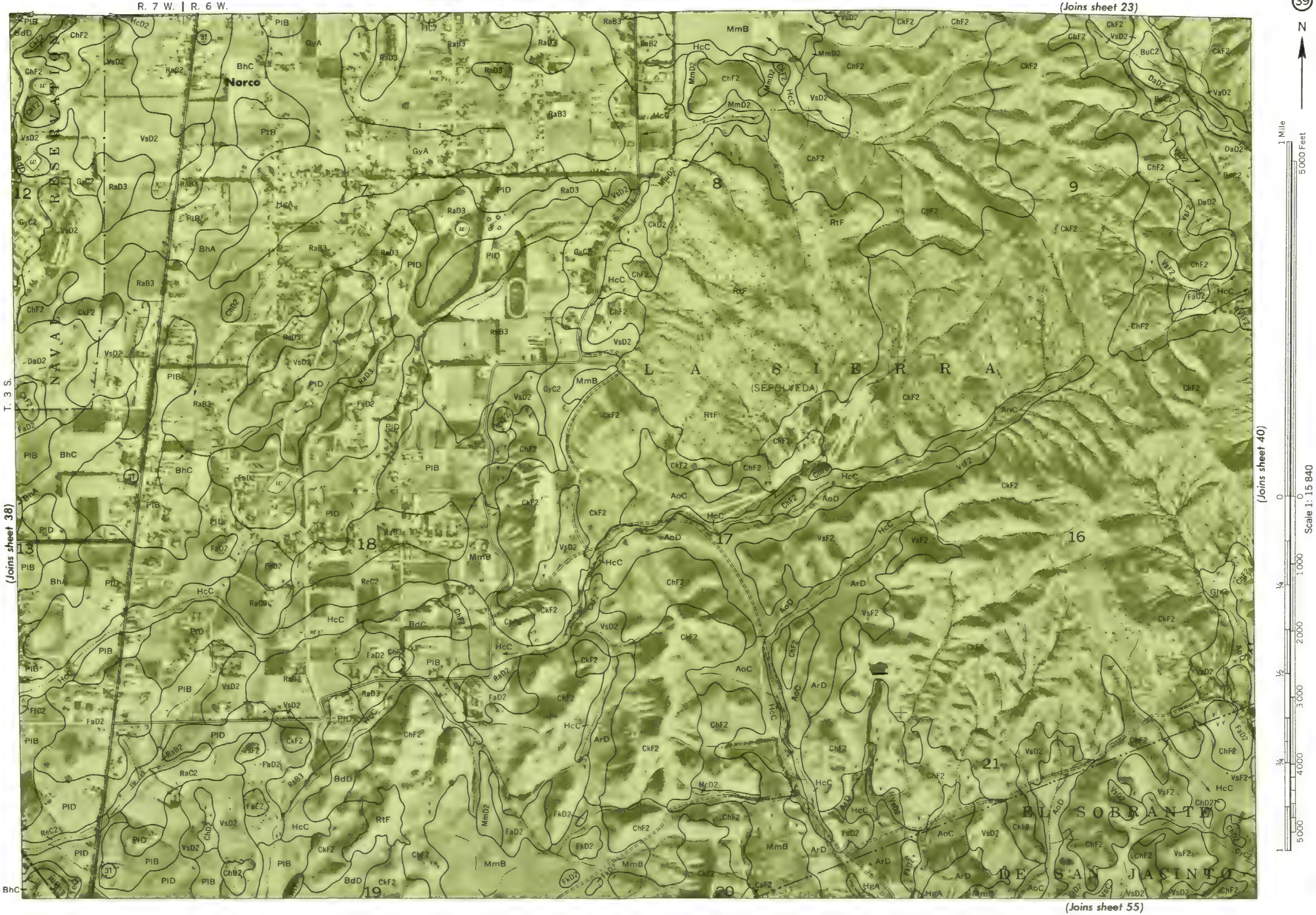
Scale 1: 15 840

0 ¼ ½ ¾ 1
0 1000 2000 3000 4000 5000

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 38

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station



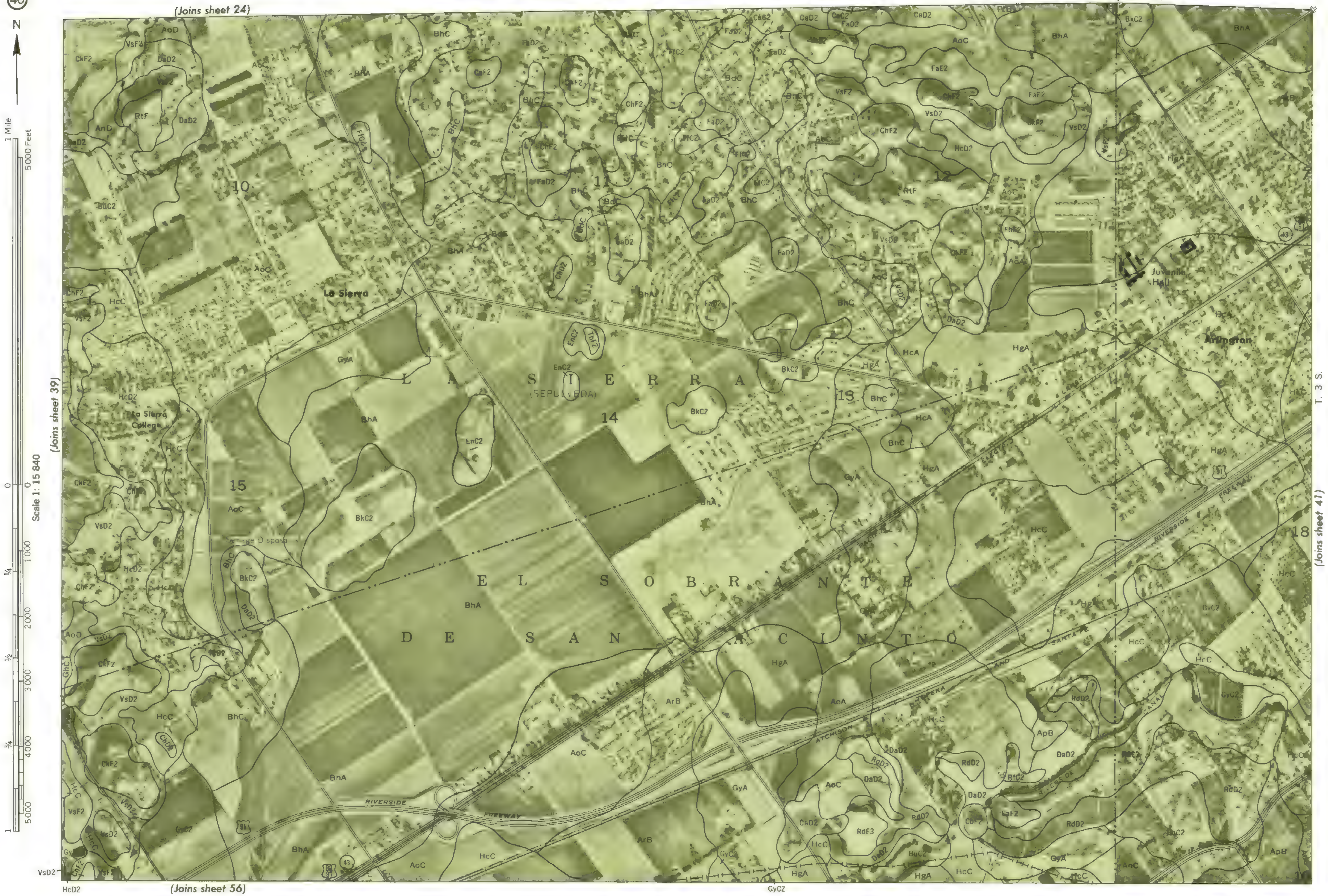
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 40

R. 6 W. | R. 5 W.

(Joins sheet 24)



(Joins sheet 39)

(Joins sheet 41)

(Joins sheet 56)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 40

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

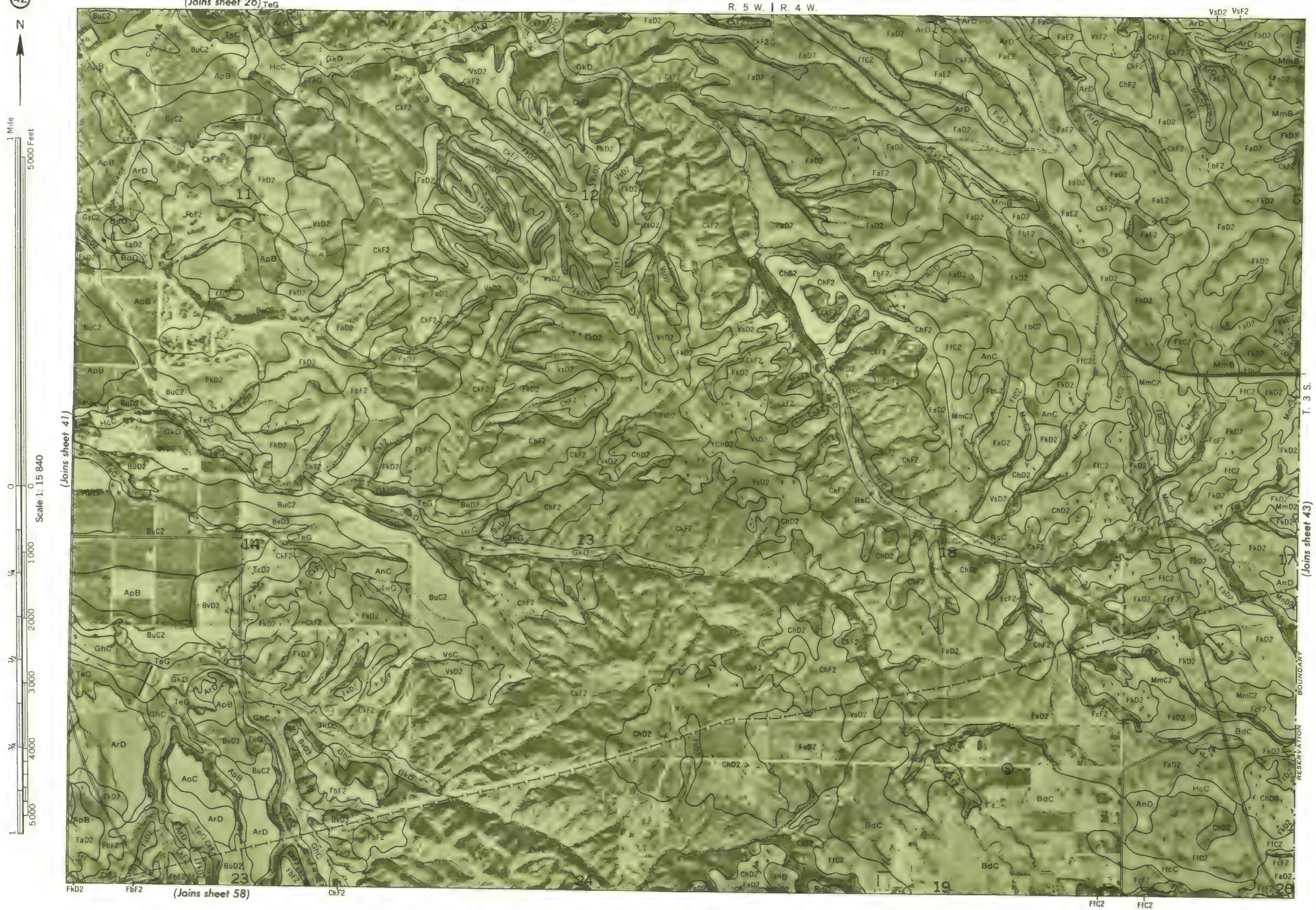
(41)

R. 5 W.

(Joins sheet 25)

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 42

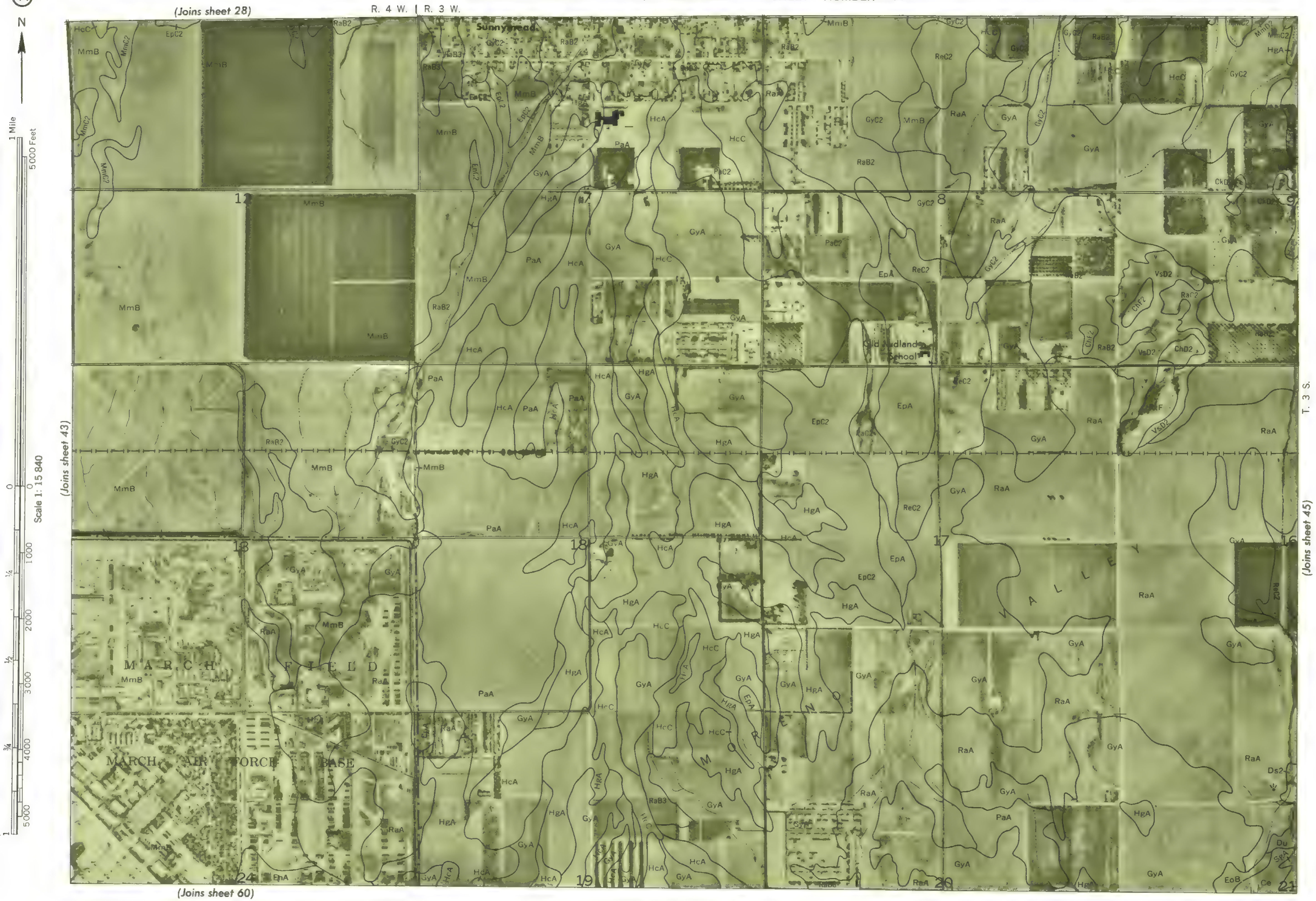
Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Stat or

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

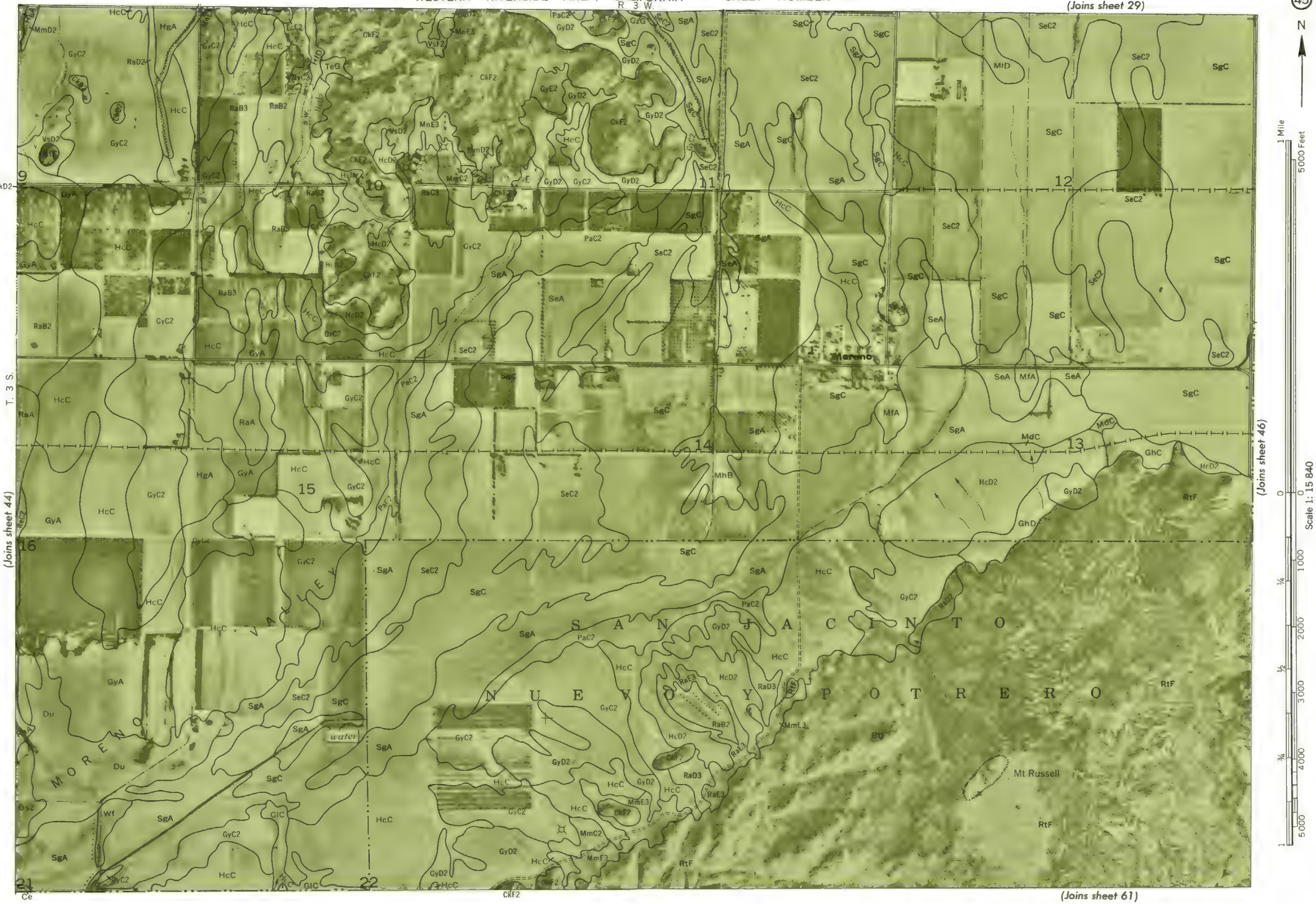
WESTERN RIVERSIDE AREA, CALIFORNIA NO. 43



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 44

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station



This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.
Land division corners are approximately positioned on this map.
WESTERN RIVERSIDE AREA, CALIFORNIA NO. 45

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 46
Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 47

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 47

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 48

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 49

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 50

(Joins sheet 34)

N

(Joins sheet 49)

(Joins sheet 51)

(Joins sheet 66)

Scale 1: 15 840

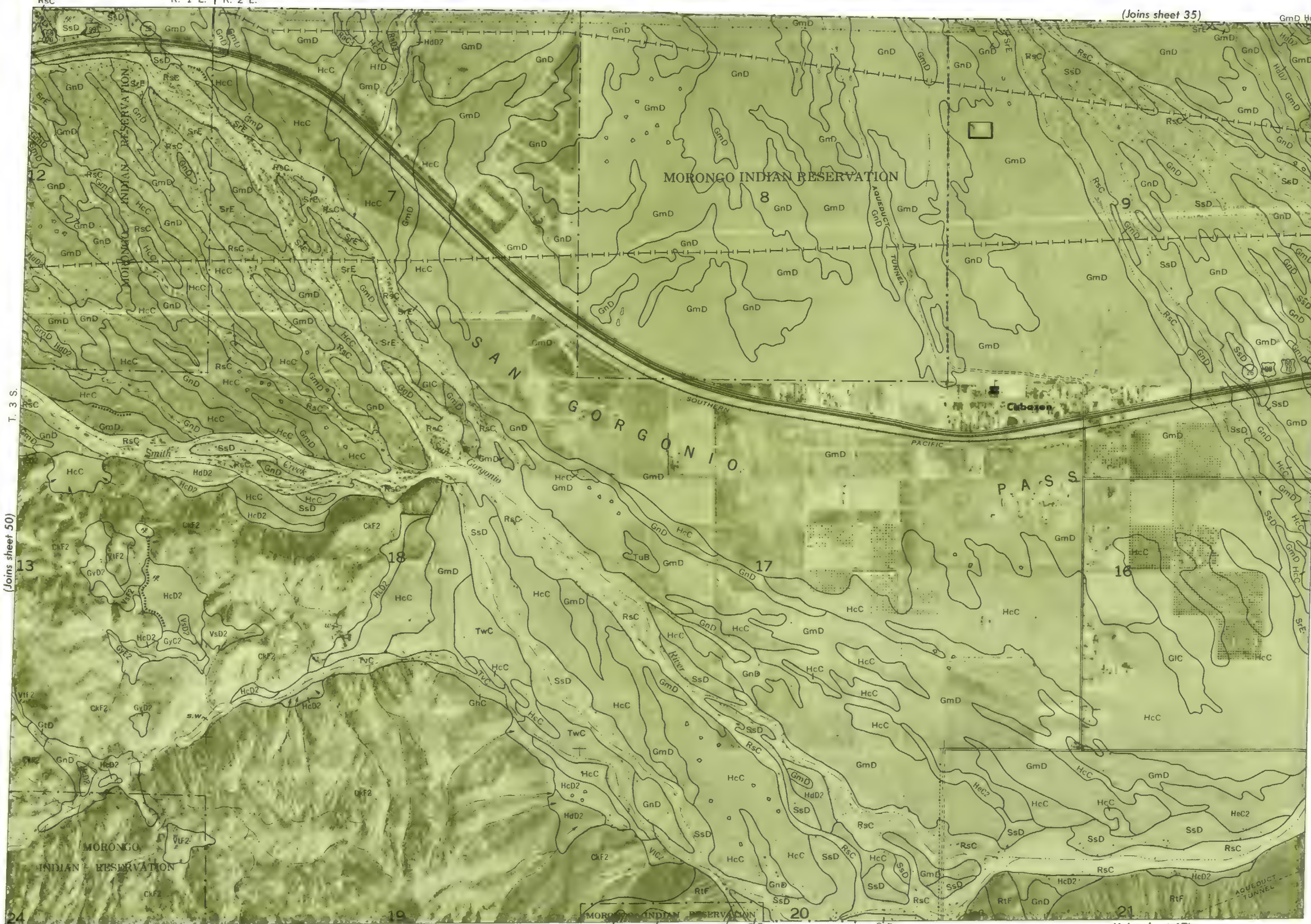
1 Mile

5000 Feet

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 50

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station



This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 51

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 52

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

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Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 53

N

Scale 1:15 840

1 Mile ¾ ½ ¼ 0

5000 Feet 4000 3000 2000 1000 0 5000

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 54

R. 7 W.

(Joins sheet 38)

(Joins sheet 53)

(Joins sheet 55)

(Joins sheet 68)

N

Scale 1: 15 840

1 Mile

5000 Feet

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 54

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

(Joins sheet 39)

(Joins sheet 54)

(Joins sheet 56)

(Joins sheet 69)

N

1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1

Scale 1: 15 840

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 55

(56)

(Joins sheet 40)

R. 6 W. | R. 5 W.

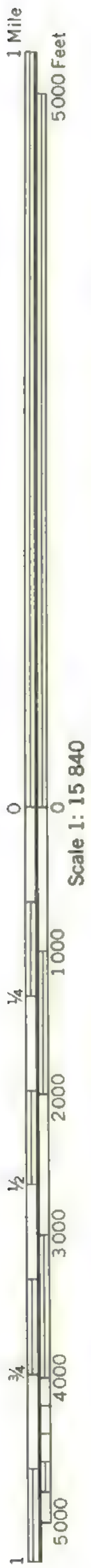
N

(Joins sheet 55)

T. 3 S.

(Joins sheet 57)

(Joins sheet 70)



Scale 1: 15 840

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 56

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

57

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 57

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

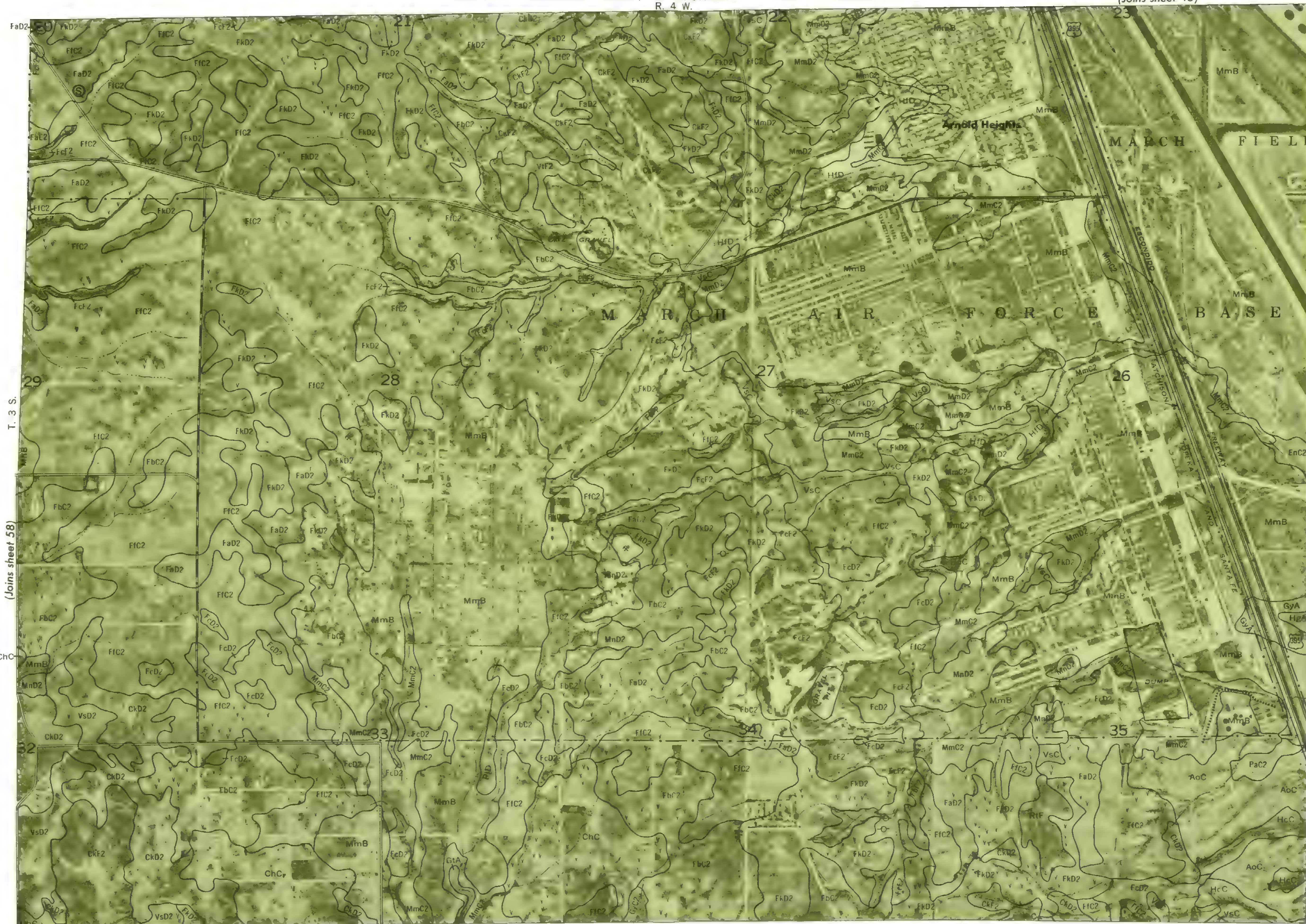
WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 58

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 58

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

(Joins sheet 43)



(Joins sheet 73)

59

N

Scale 1:15 840

1 Mile

5000 Feet

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 59

(Joins sheet 44)

R. 4 W. | R. 3 W.

(Joins sheet 59)

(Joins sheet 61)

(Joins sheet 74)

T. 3 S.

N

Scale 1:15 840

1 Mile | 5000 Feet

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 60

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

(Joins sheet 45)

61

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 61

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 62

Land division corners are approximately positioned on this map

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

R. 2 W. | R. 1 W.

(Joins sheet 47)

T. 3 S.

(Joins sheet 62)

(Joins sheet 64)

SmE2

Tt2

DpB

(Joins sheet 77)

N

1 Mile

5000 Feet

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

Scale 1: 15 840

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 63

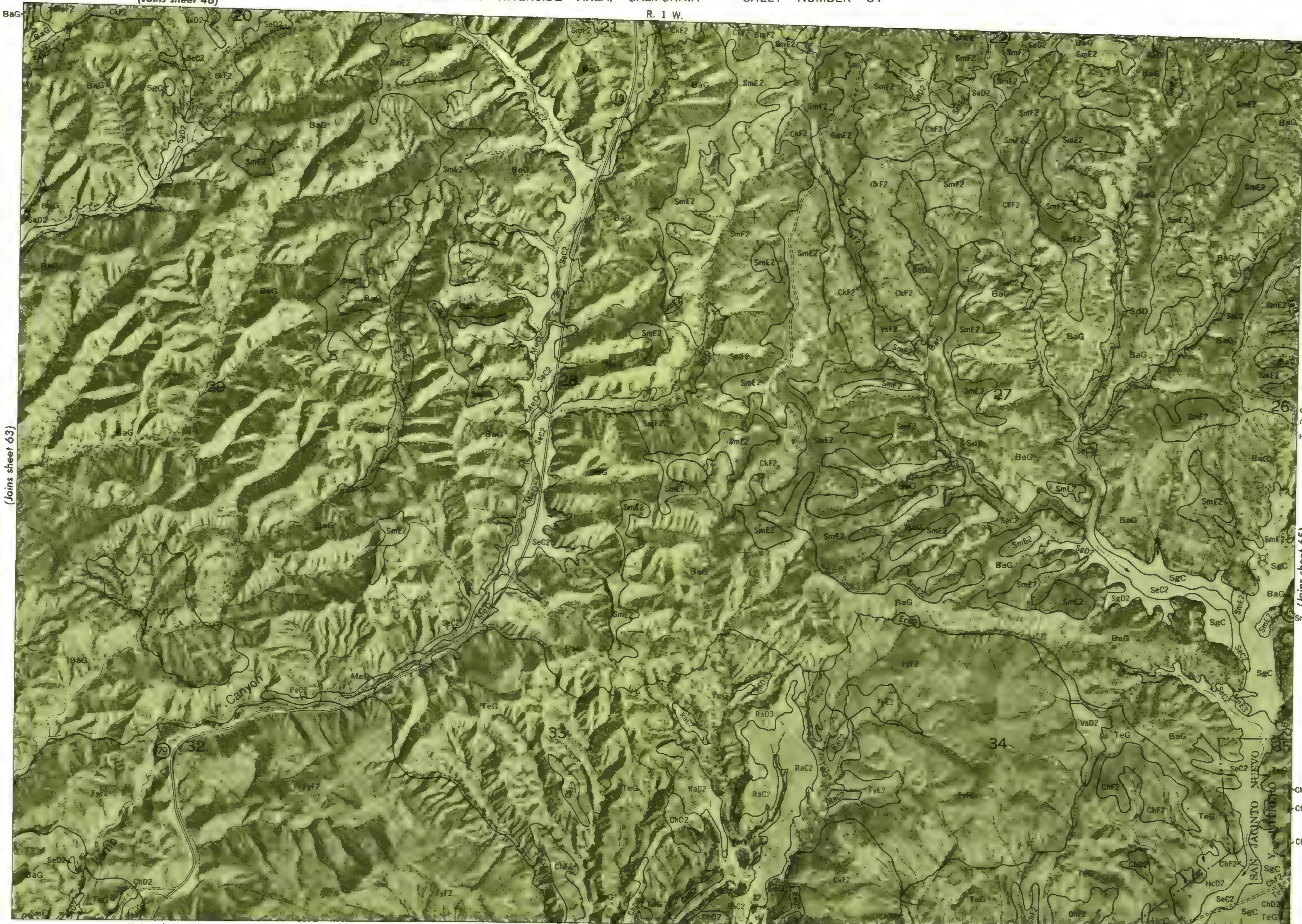
(Joins sheet 48)

R. 1 W.

N

1 Mile
5000 Feet
Scale 1: 15 840
0 ¼ ½ ¾ 1
0 1000 2000 3000 4000 5000

(Joins sheet 63)



(Joins sheet 65)

(Joins sheet 78)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 64

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 65

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 66

(Joins sheet 50)

(Joins sheet 65)

(Joins sheet 67)

(Joins sheet 80)

N

Scale 1: 15 840

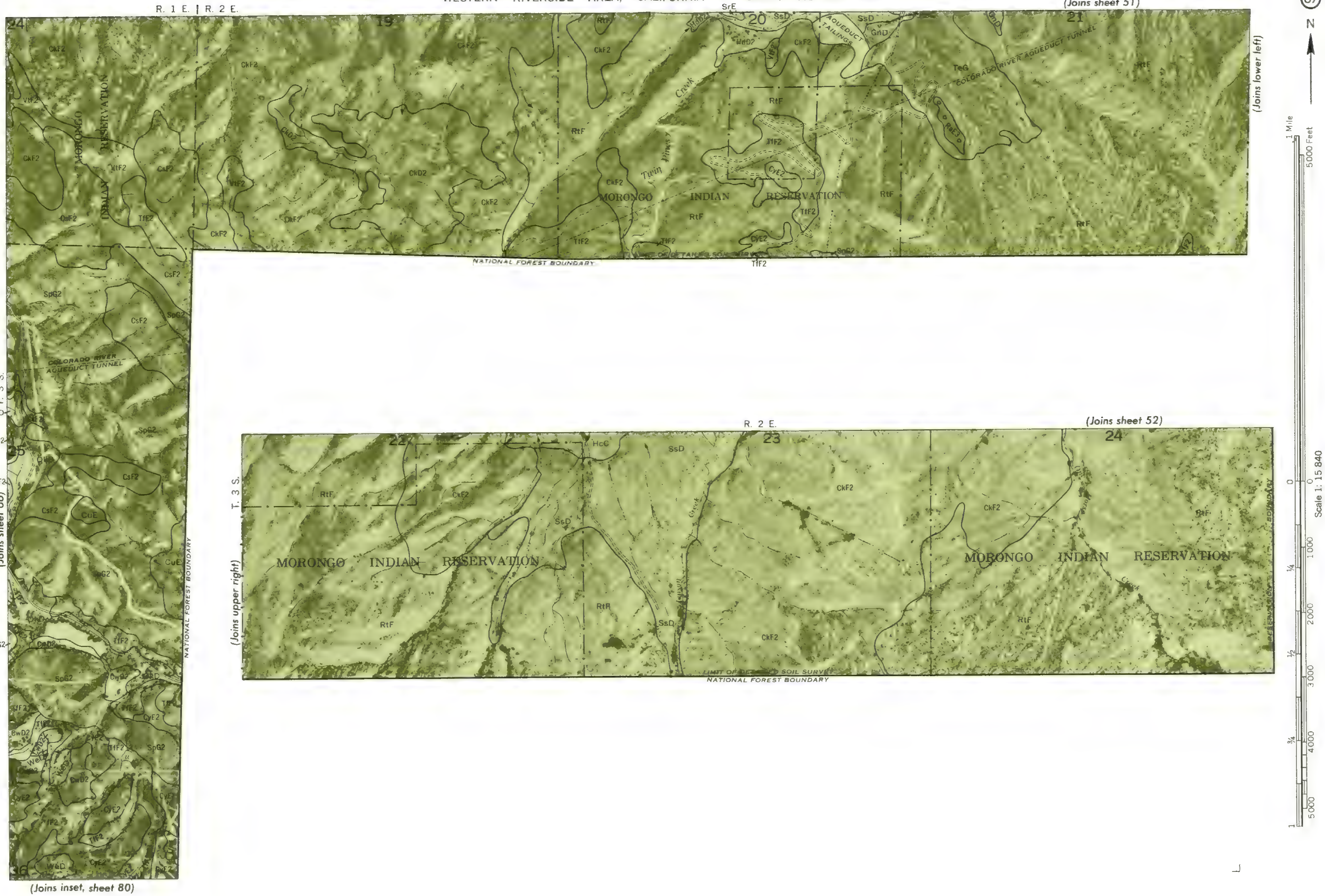
1 Mile

5000 Feet

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 66

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station



This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 67

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 68

N

Scale 1: 15 840

1 Mile · ¾ · ½ · ¼ · 0

5000 Feet · 5000 · 4000 · 3000 · 2000 · 1000 · 0

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 68

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

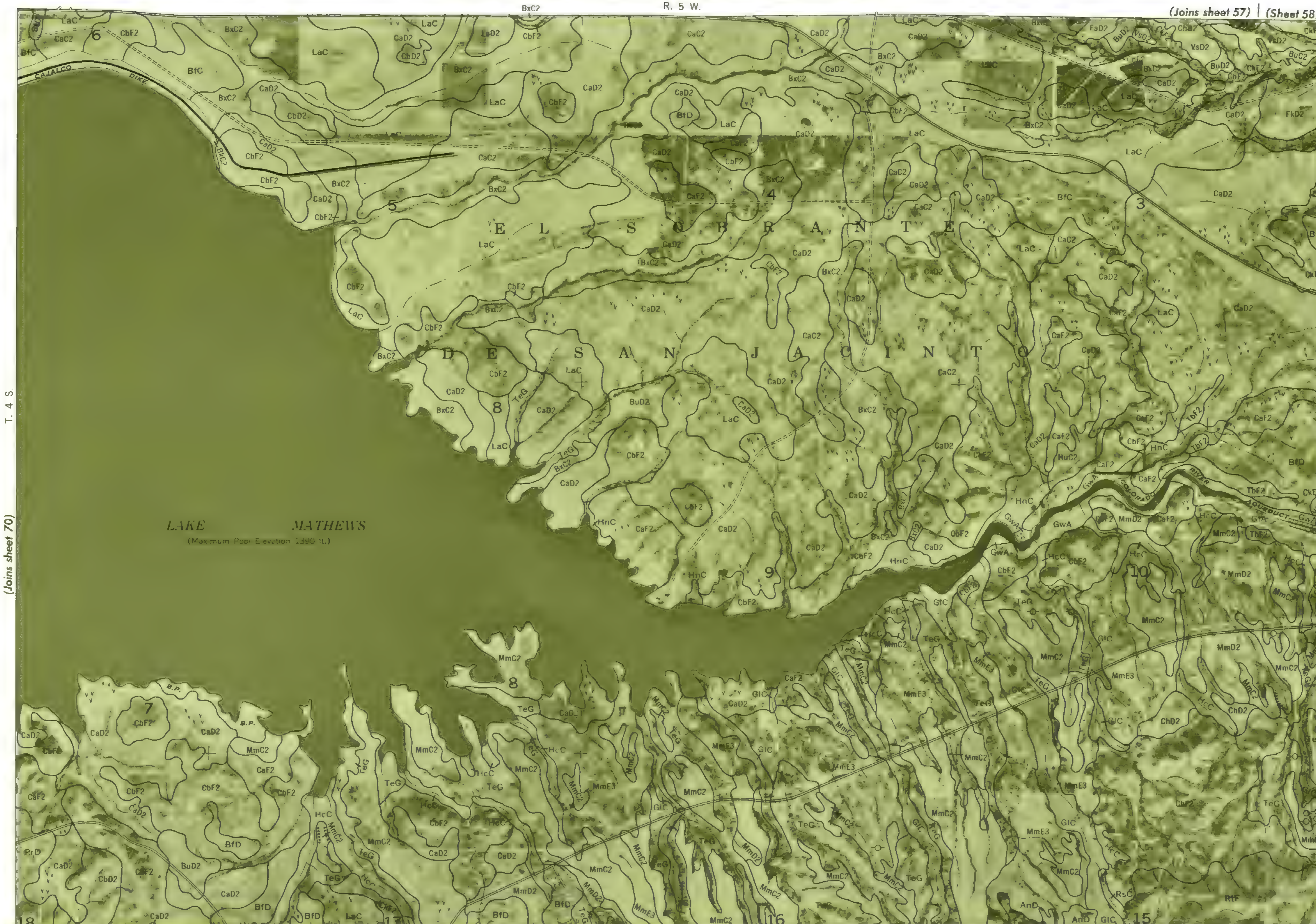
WESTERN RIVERSIDE AREA, CALIFORNIA NO. 69

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 70
Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

R. 5 W.

T. 4 S.



N

1 Mile

5000 Feet

Scale 1: 15 840

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 71

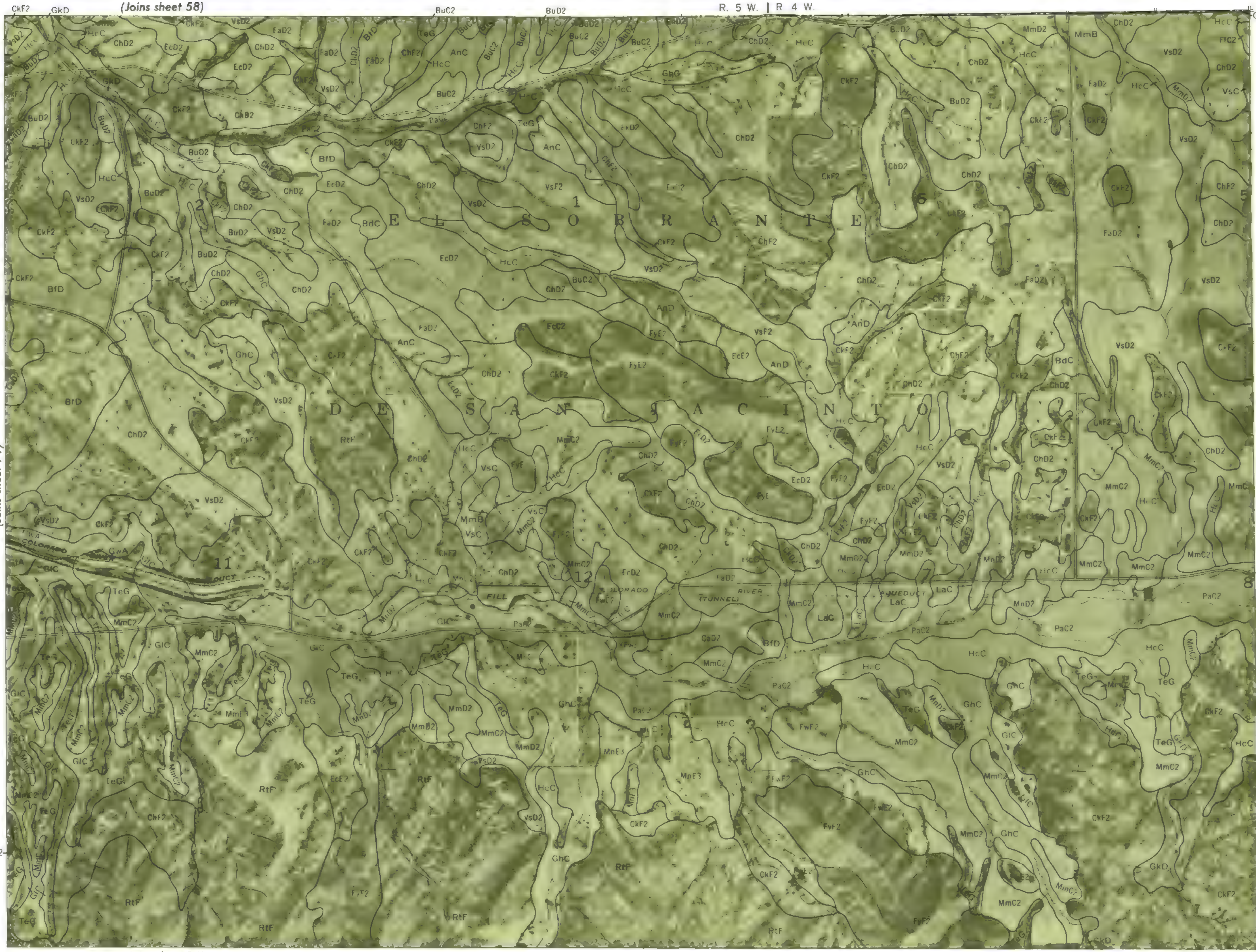
Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

N

(Joins sheet 58)

R. 5 W. | R. 4 W.



(Joins sheet 71)

(Joins sheet 73)

T. 4 S.

(Joins sheet 84)

1 Mile

5000 Feet

Scale 1: 15 840

0 1000 2000 3000 4000 5000

0 1/4 1/2 3/4 1

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 72

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

(73)

(Joins sheet 59)

(Joins sheet 72)

(Joins sheet 74)

(Joins sheet 85)

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 73

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 74

N

1 Mile
5000 Feet
Scale 1: 15 840

(Joins sheet 60)

R. 4 W. | R. 3 W.

(Joins sheet 73)

(Joins sheet 75)

(Joins sheet 86)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 74

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 75

76

N

(Joins sheet 62)

R. 2 W.

(Joins sheet 75) | (61)

(Joins sheet 75)

(Joins sheet 77)

(Joins sheet 88)

1 Mile
5000 Feet
Scale 1: 15 840
0 ¼ ½ ¾ 1
0 1000 2000 3000 4000 5000

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 76

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

(77)

R. 2 W. | R. 1 W.

(Joins sheet 63)

(Joins sheet 76)

(Joins sheet 78)

(Joins sheet 89)

1 Mile — 5000 Feet

Scale 1: 15 840

This map is one of a ... compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 77

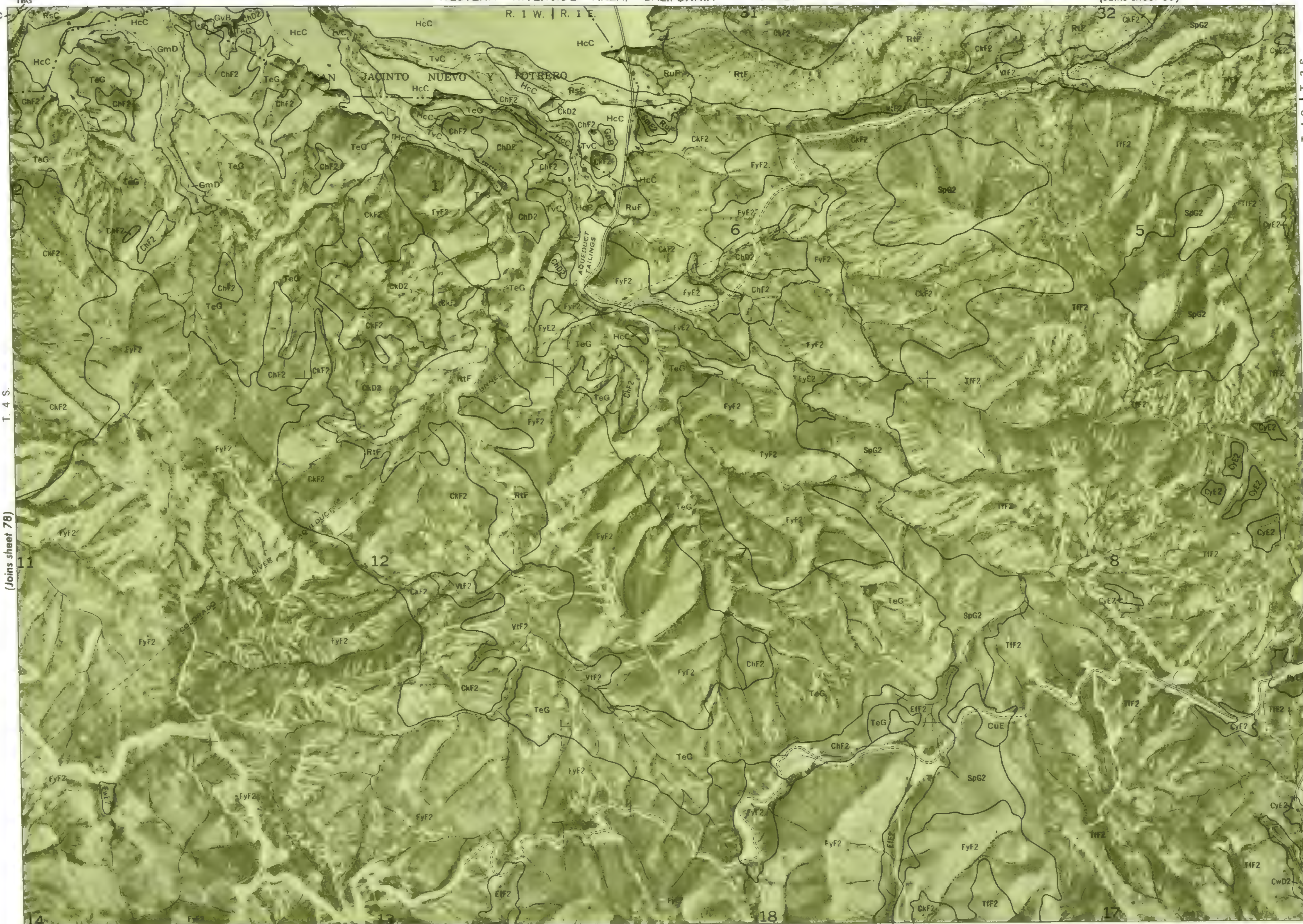
WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 78

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 78

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

(Joins sheet 65)



(Joins sheet 78)

(Joins sheet 80)

(Joins sheet 91)

Scale 1: 15 840

1 Mile

5000 Feet

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

Land division corners are approximately positioned on this map.

(80)

N

(Joins sheet 66)

(Joins sheet 92)

(Joins sheet 67)

(Joins upper right)

R. 1 E.

1 Mile

5000 Feet

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

Scale 1: 15 840

T. 4 S. | T. 3 S.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 80

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 82

N

(Joins sheet 70)

R. 6 W. | R. 5 W.

1 Mile

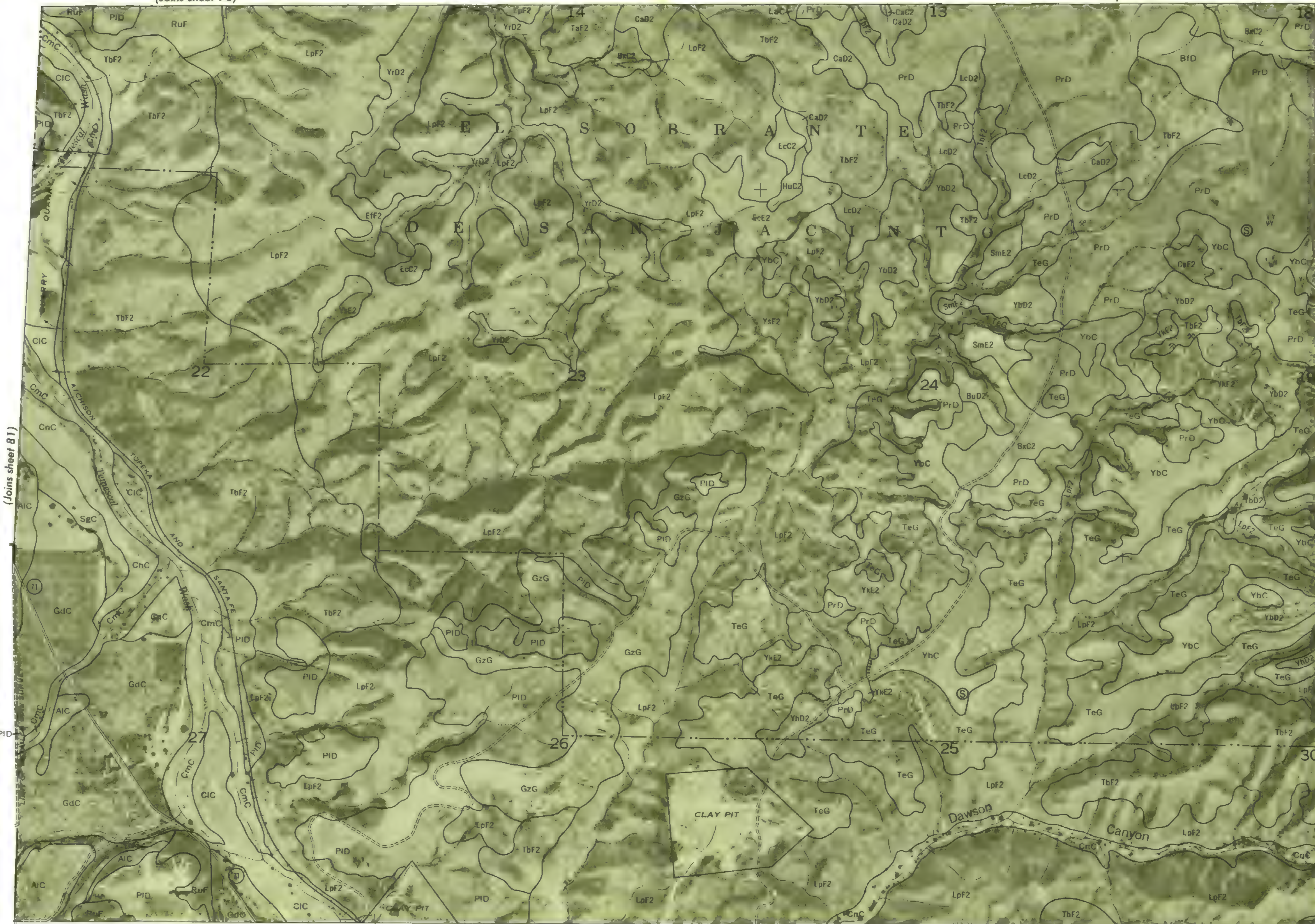
5000 Feet

Scale 1: 15 840

0 1/4 1/2 3/4 1

0 1000 2000 3000 4000 5000

(Joins sheet 81)



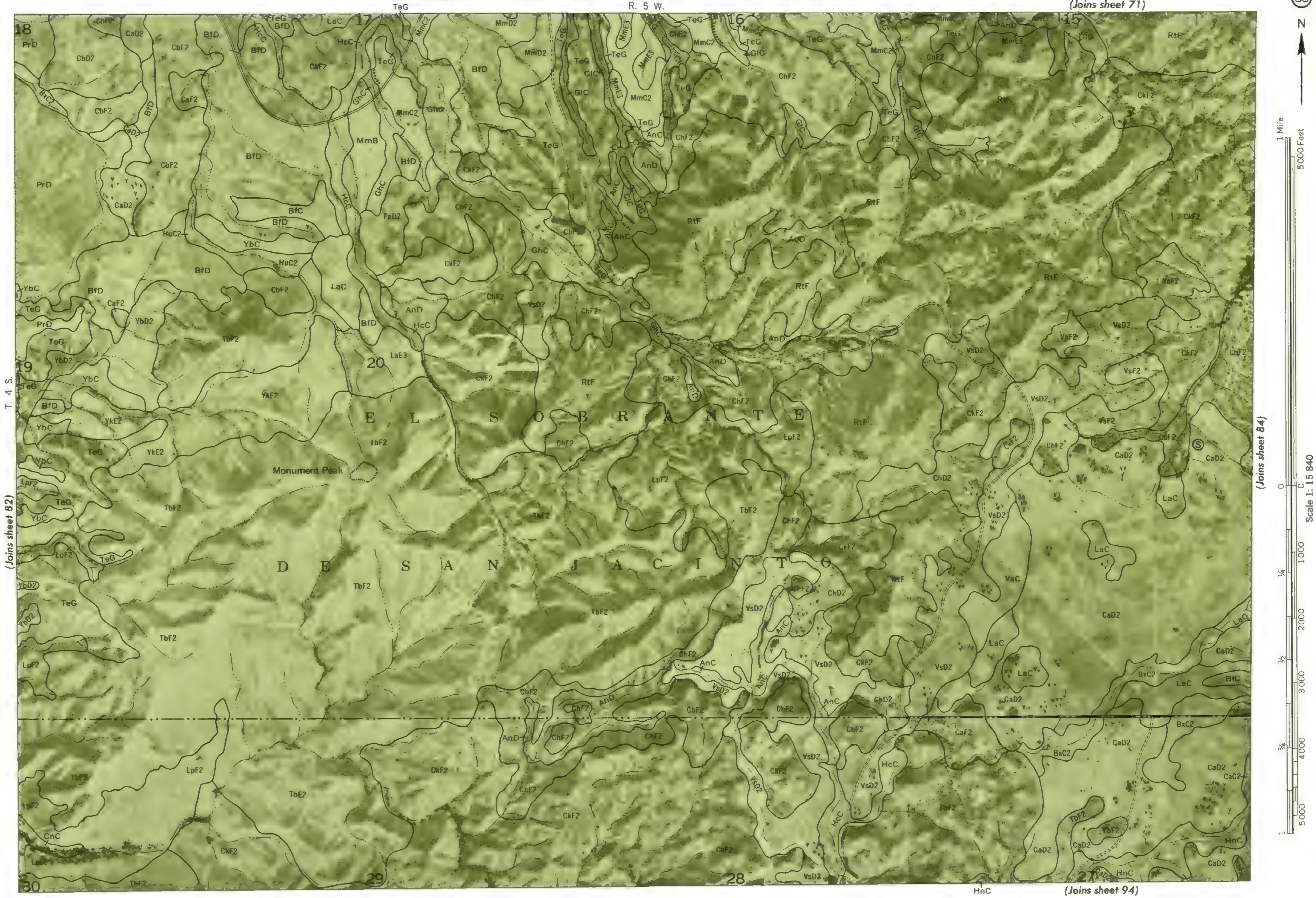
(Joins sheet 83)

(Joins sheet 93)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 82

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.



This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

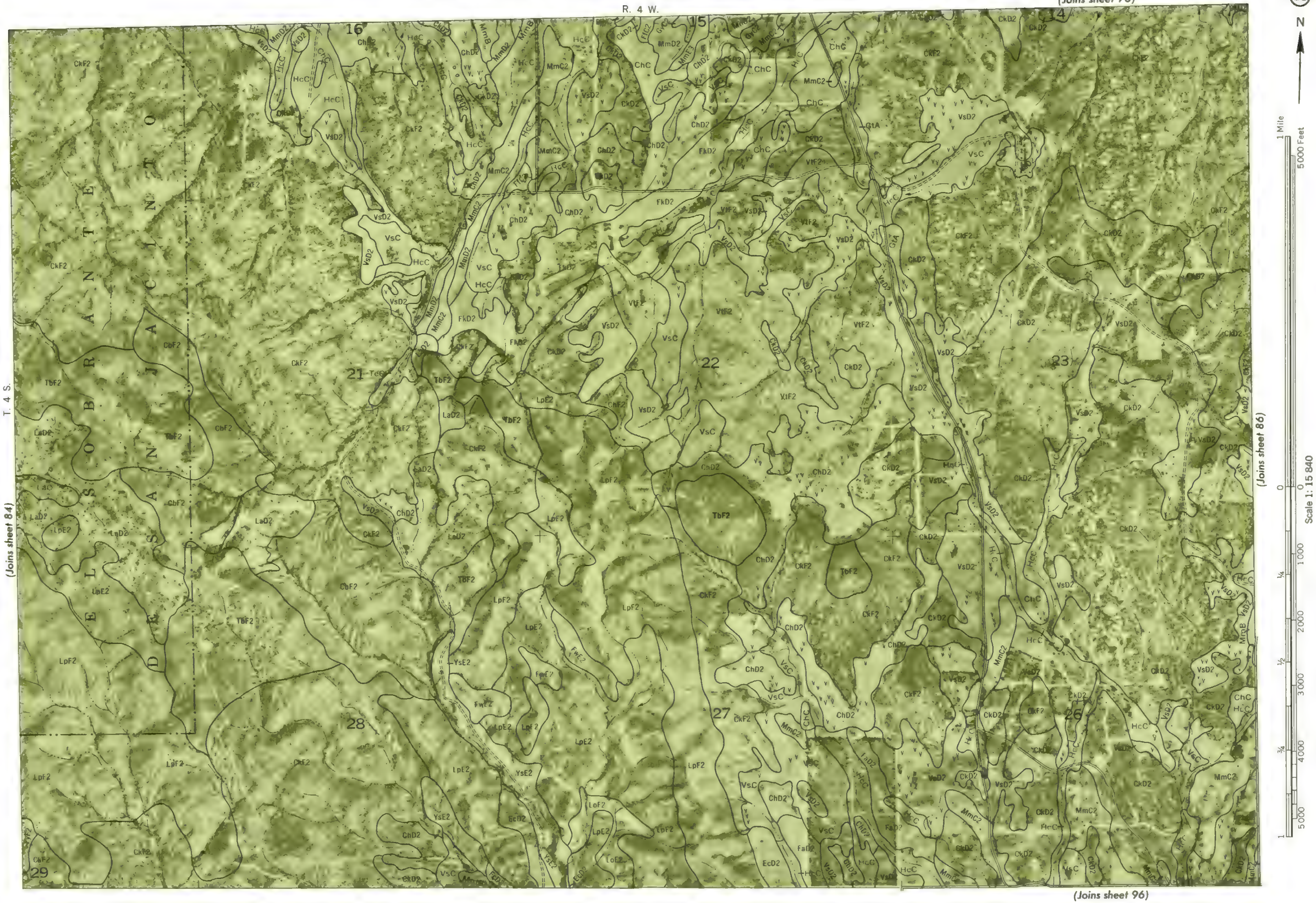
Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 83

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 84

Land division corners are approximately positioned on this map.

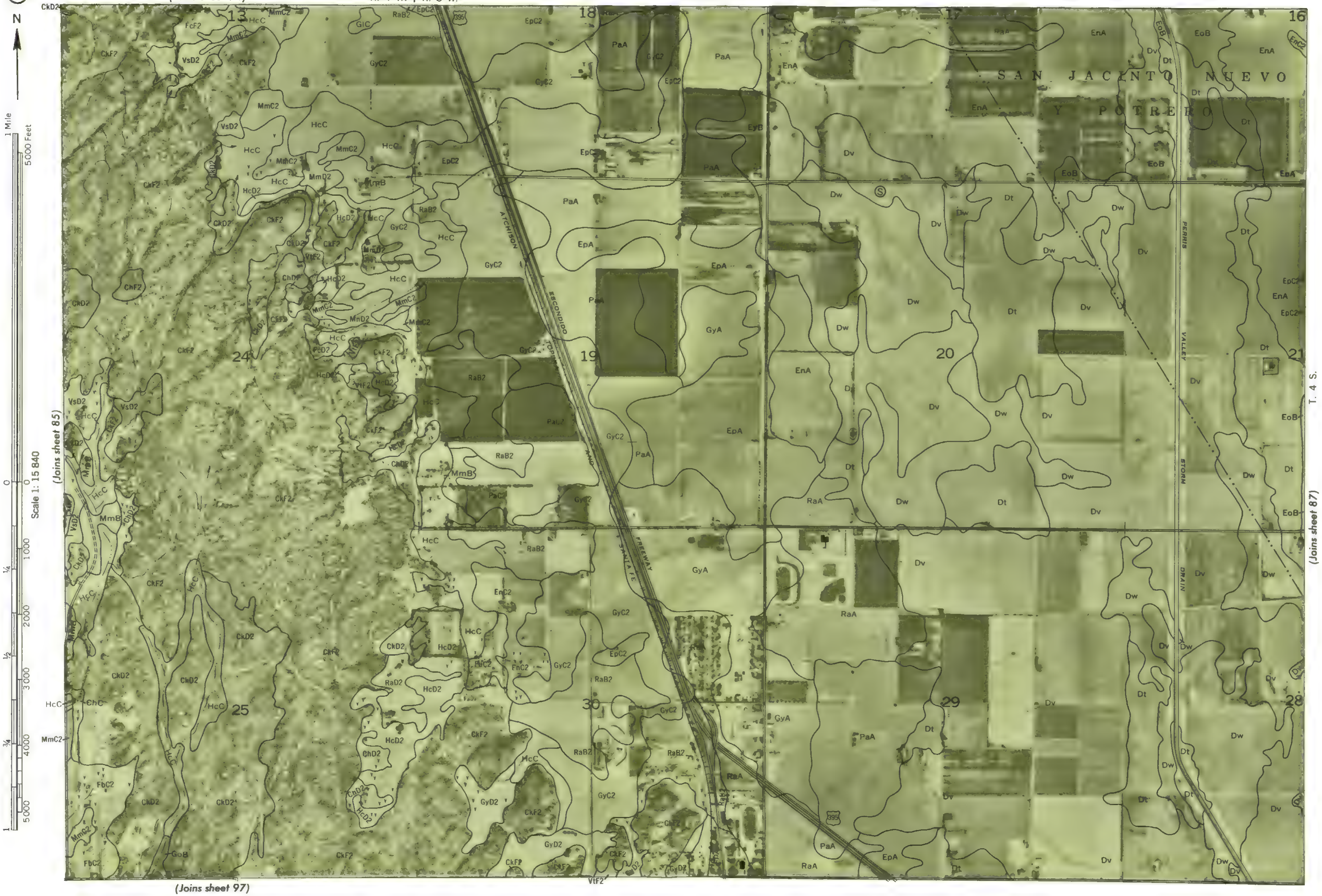
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 85

Land division corners are approximately positioned on this map

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 86

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 87

N

(Joins sheet 76)

(Joins sheet 87)

(Joins sheet 89)

(Joins sheet 99)

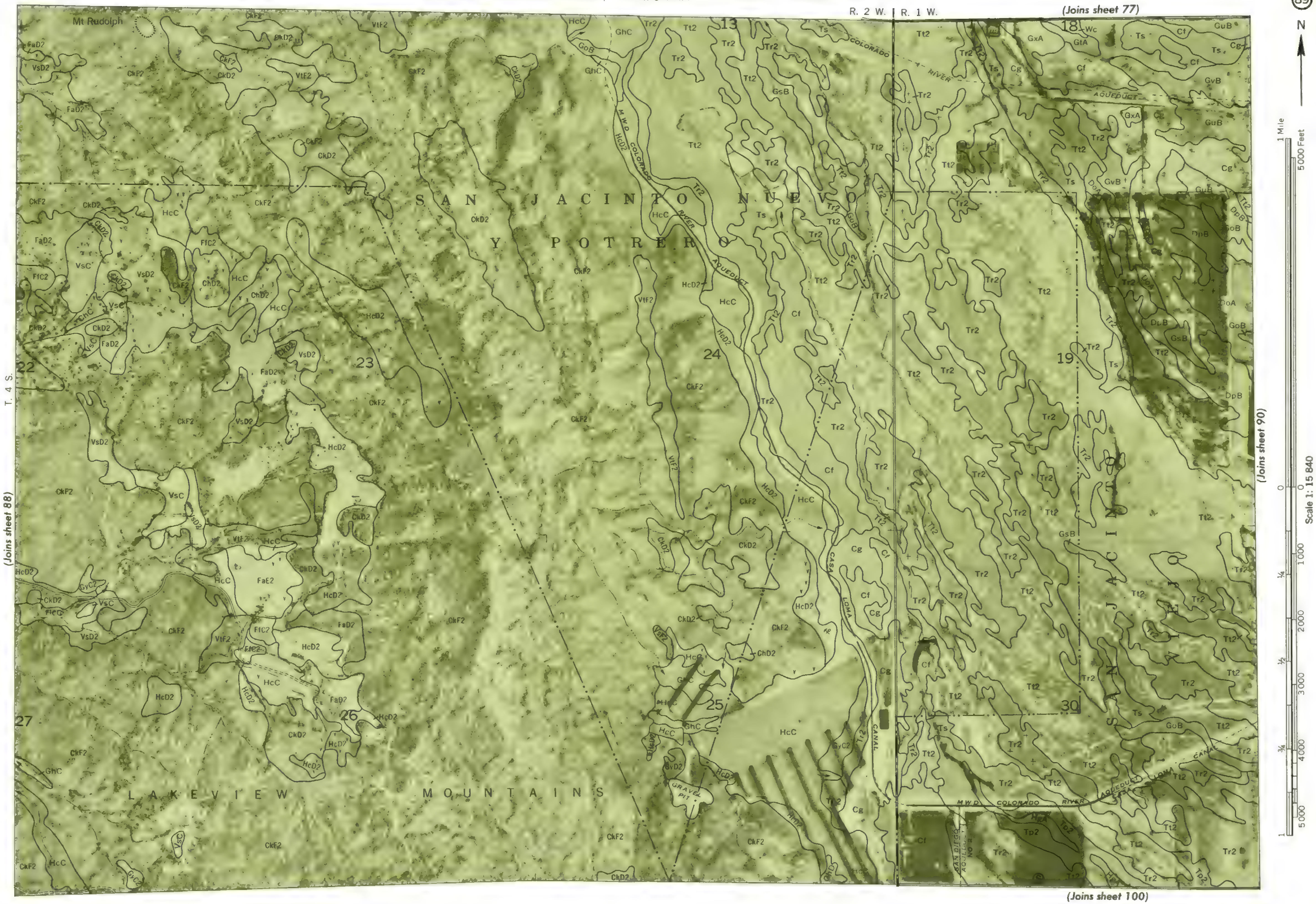
1 Mile
5000 Feet
Scale 1: 15 840
0 1000 2000 3000 4000 5000
0 1/4 1/2 3/4 1

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 88

Land division corners are approximately positioned on this map.

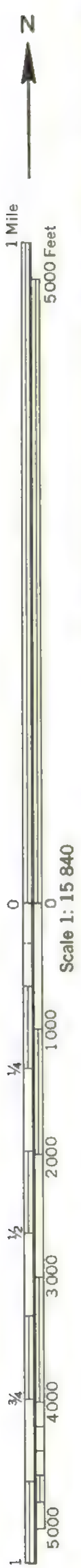
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

89

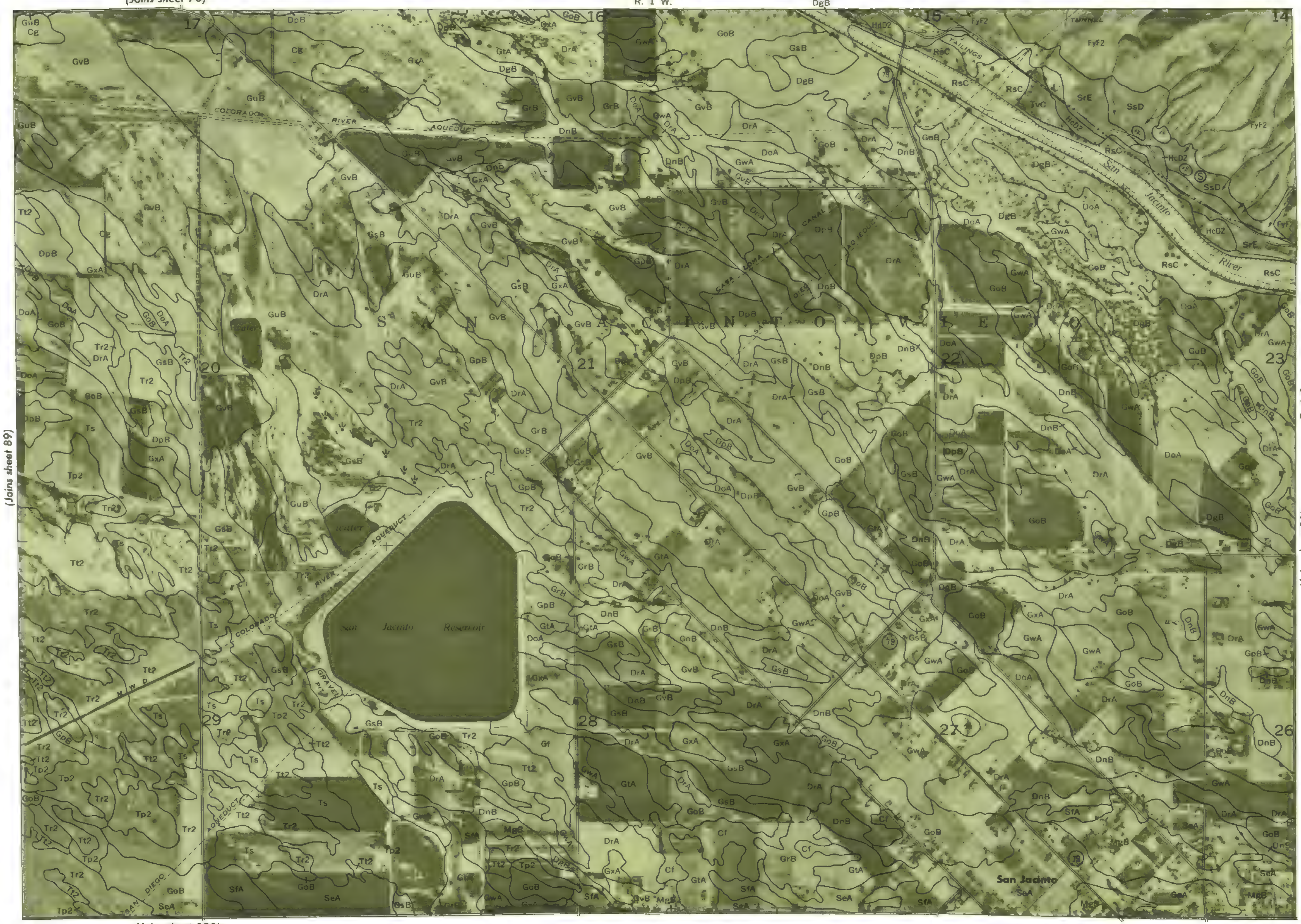


This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station
Land division corners are approximately positioned on this map

(Joins sheet 78)



(Joins sheet 89)



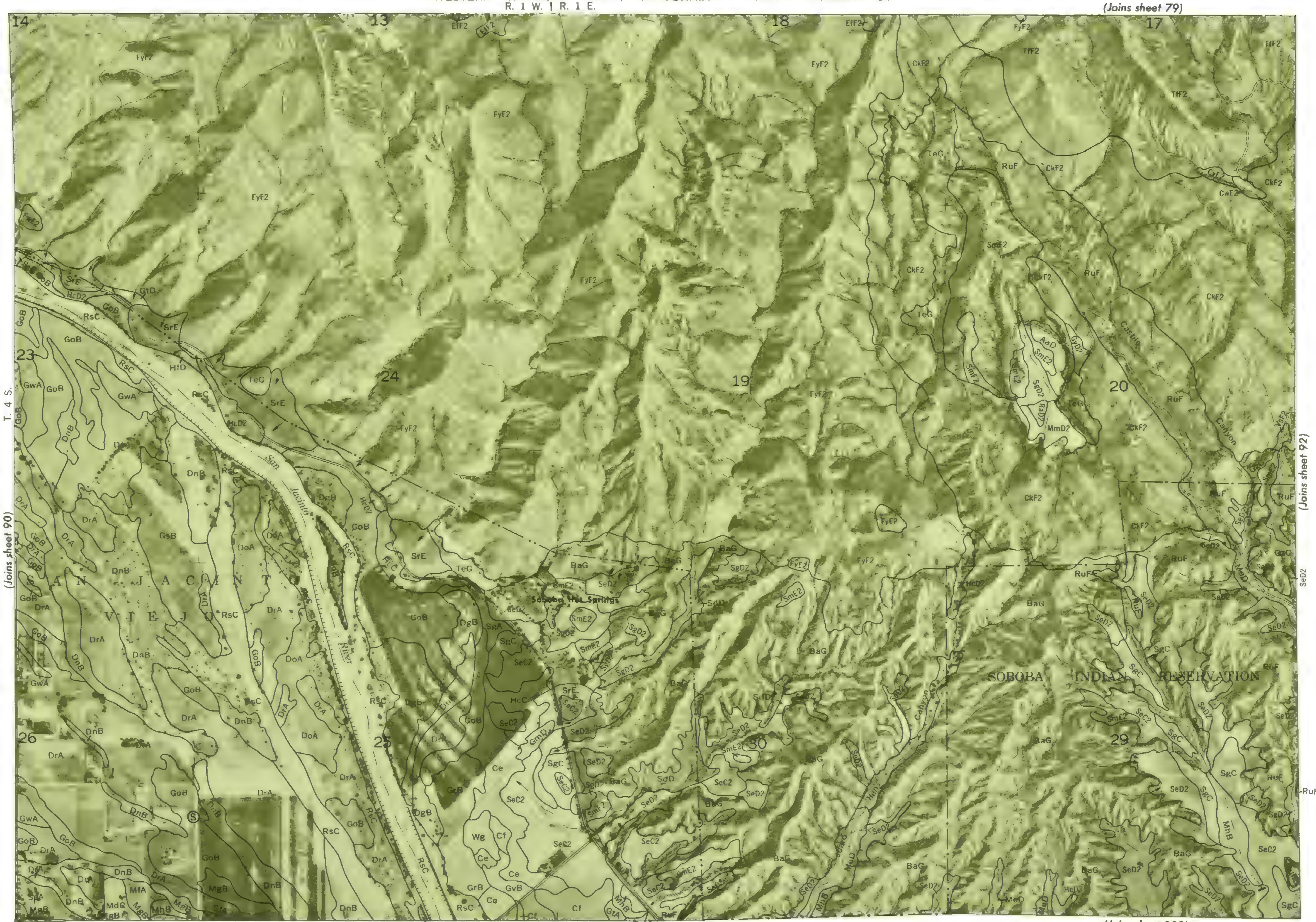
(Joins sheet 91)

(Joins sheet 101)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 90

Land division corners are approximately positioned on this map

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station



This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

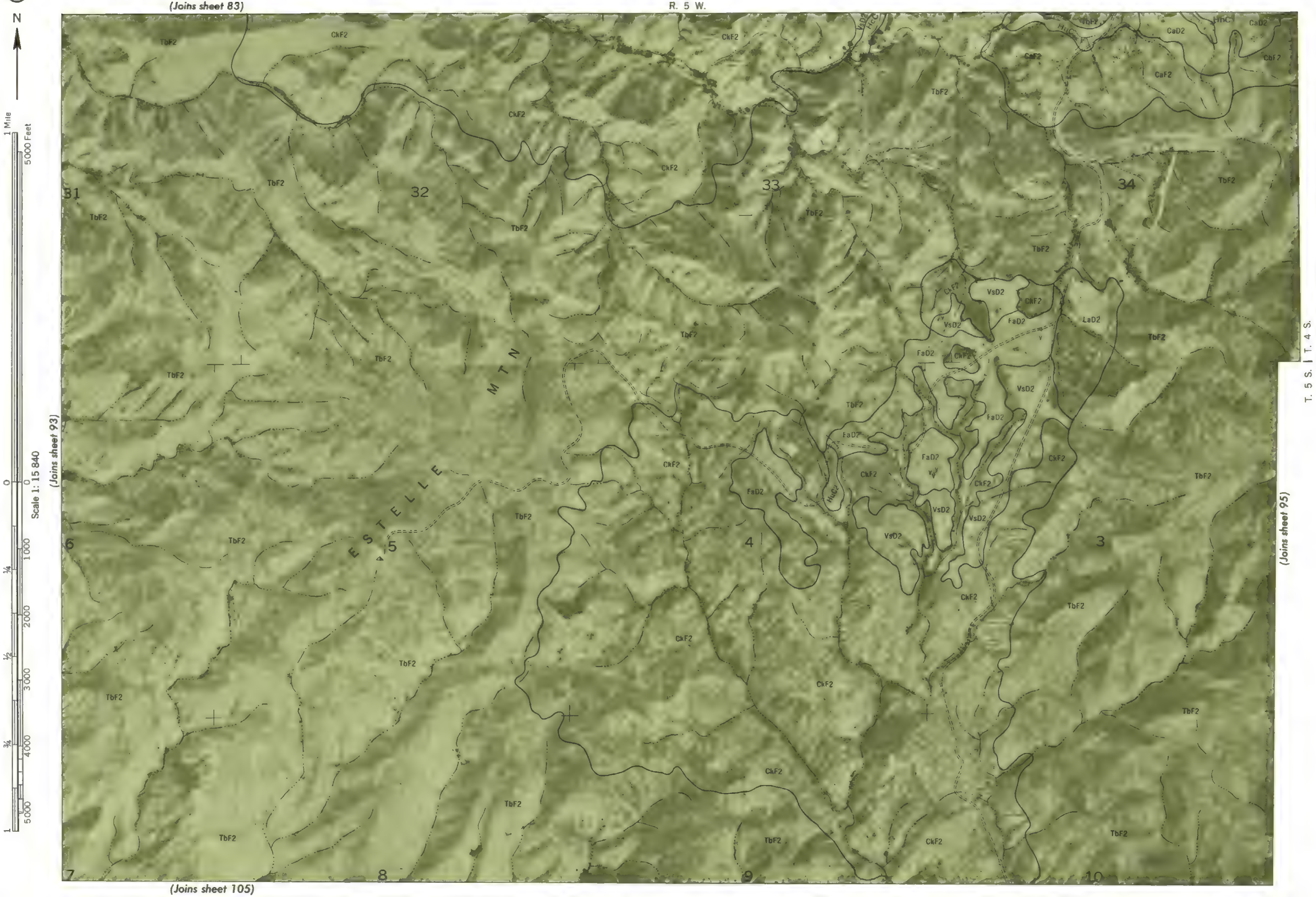
WESTERN RIVERSIDE AREA, CALIFORNIA NO. 92

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 94

Land division corners are approximately positioned on this map.

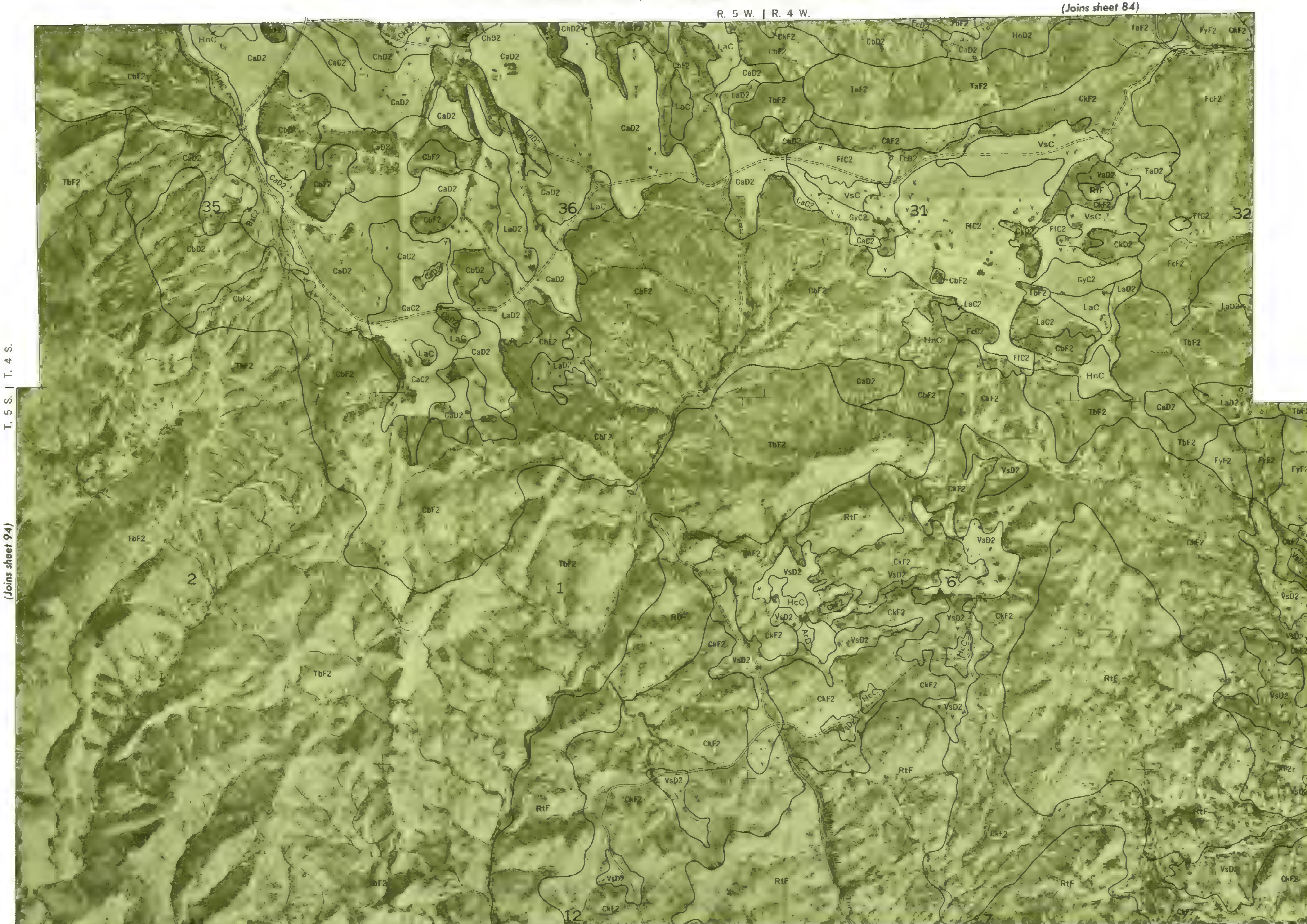
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

95

R. 5 W. | R. 4 W.

(Joins sheet 84)

N



T. 4 S. | T. 5 S.

(Joins sheet 94)

(Joins sheet 96)

(Joins sheet 106)

CkF2

1 Mile 5000 Feet

0 1/4 1/2 3/4 1

0 1000 2000 3000 4000 5000

Scale 1: 15 840

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 95

(Joins sheet 85)

R. 4 W.

N

1 Mile
5000 Feet
Scale 1:15 840
0 1000 2000 3000 4000 5000
0 ¼ ½ ¾ 1

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 96

Land division corners are approximately positioned on this map.

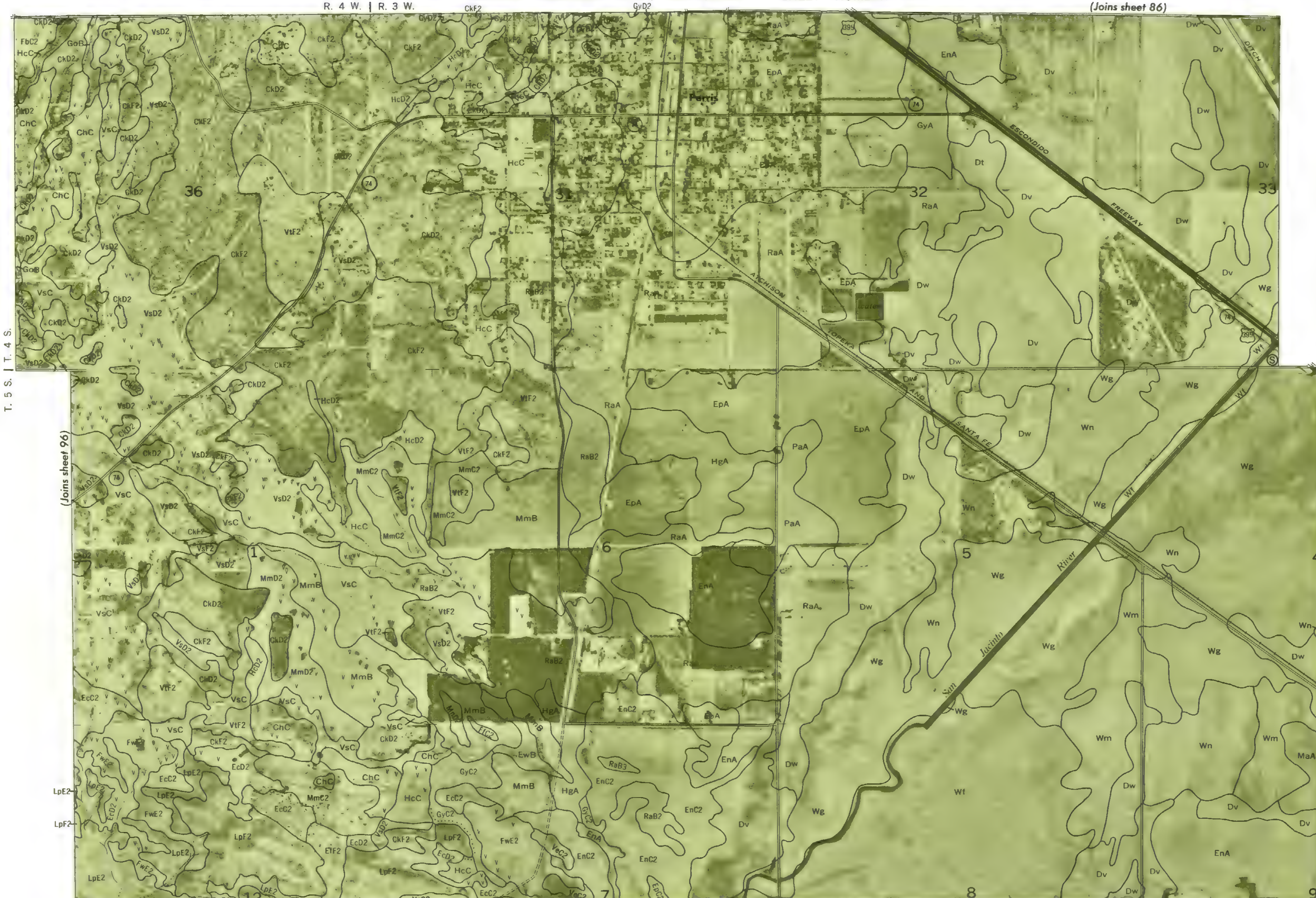
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

R. 4 W. | R. 3 W.

(Joins sheet 86)

97

N



T. 4 S. | T. 5 S.

(Joins sheet 96)

(Joins sheet 98)

(Joins sheet 108)

1 Mile — 5000 Feet

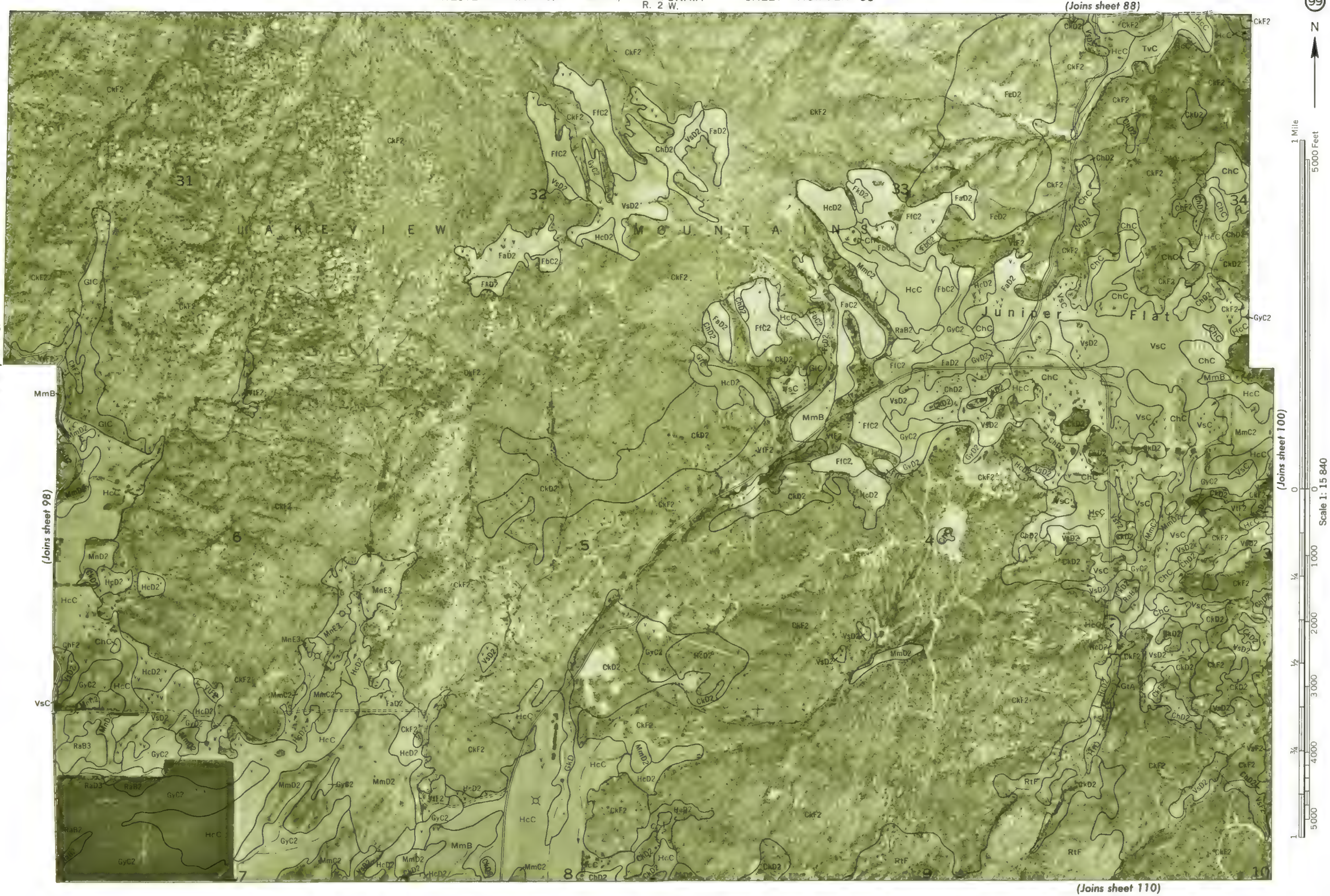
Scale 1: 15 840

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 97

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

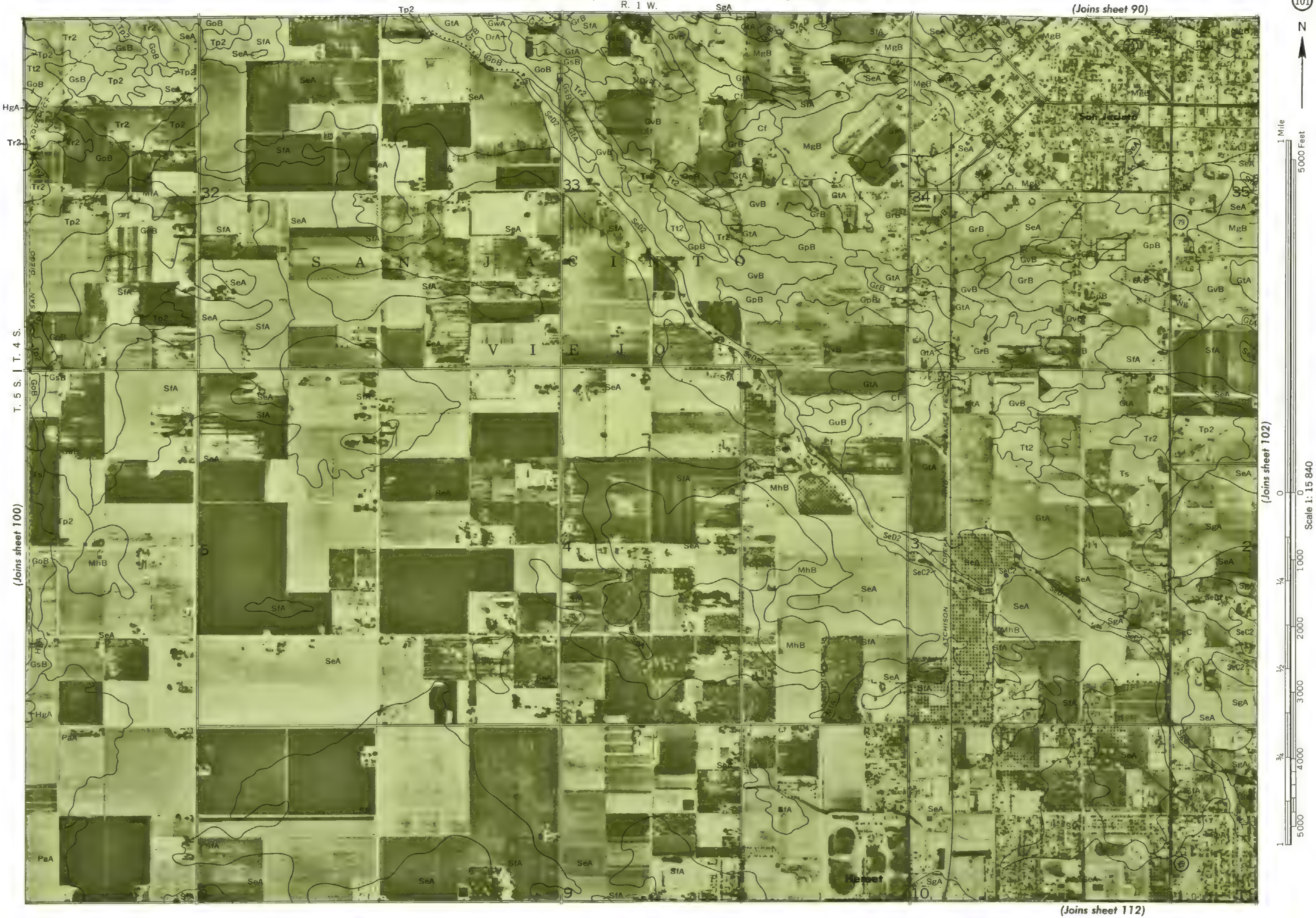

(Joins sheet 87)
R 3 W.
N
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
0
1/4
1/2
3/4
1
Scale 1:15 840
(Joins sheet 97)
(Joins sheet 99)
(Joins sheet 109)
T. 5 S. | T. 4 S.
PERRIS VALLEY STORM DRAIN
San Jacinto River
ESCONDIDO
AT & SF
33
34
35
36
4
3
2
1
9
10
11
12


R. 2 W.
(Joins sheet 88)
99
N
LAKEVIEW MOUNTAINS
Juniper Flat
T. 4 S.
T. 5 S.
(Joins sheet 98)
(Joins sheet 100)
(Joins sheet 110)
31
32
33
34
6
5
4
7
8
9
10
1 Mile
5000 Feet
Scale 1:15 840

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 100

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station



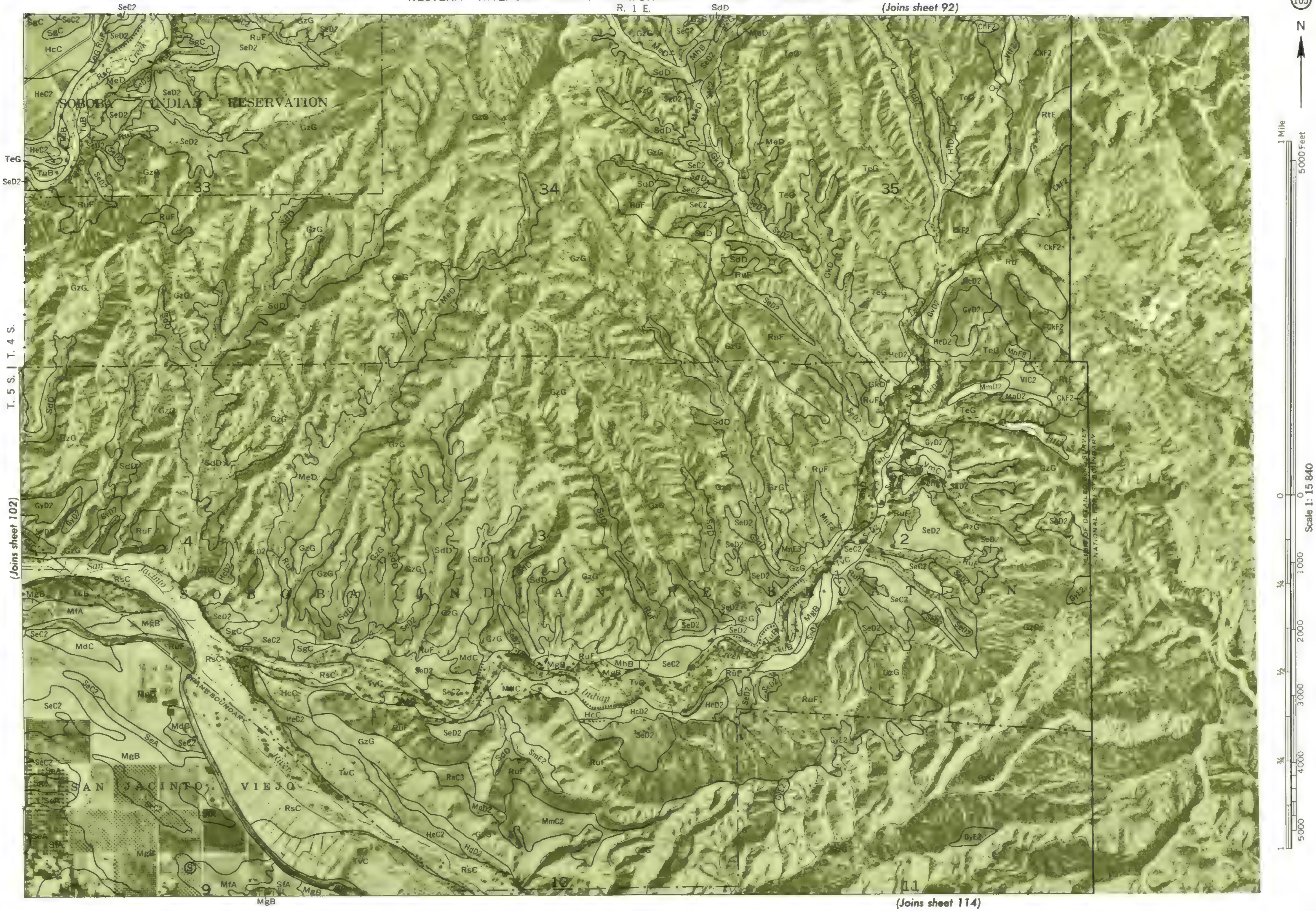
This map is one of a set compiled in 1959 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 102

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.



This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 103

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 104

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

(105)

R. 5 W.

(Joins sheet 94)

(Joins sheet 104)

(Joins sheet 106)

(Joins sheet 115)

N

1 Mile — 5000 Feet

Scale 1: 15 840

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 105

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 106

R. 5 W. | R. 4 W.

(Joins sheet 95)

N

Scale 1: 15 840

1 Mile — ¾ — ½ — ¼ — 0

5000 Feet — 4000 — 3000 — 2000 — 1000 — 0

(Joins sheet 105)

T. 5 S.

(Joins sheet 107)

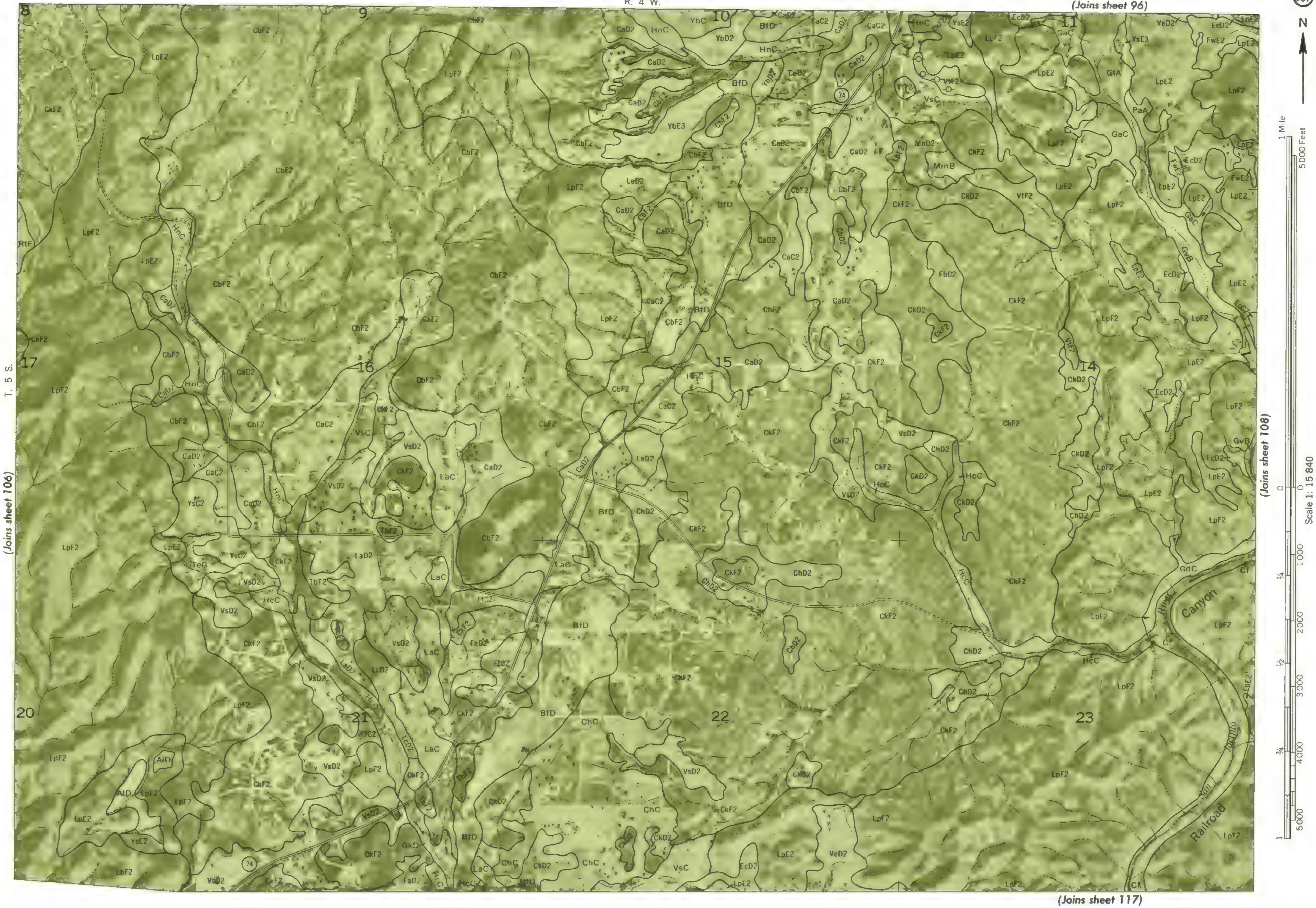
(Joins sheet 116)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 106

Land division corners are approximately positioned on this map

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

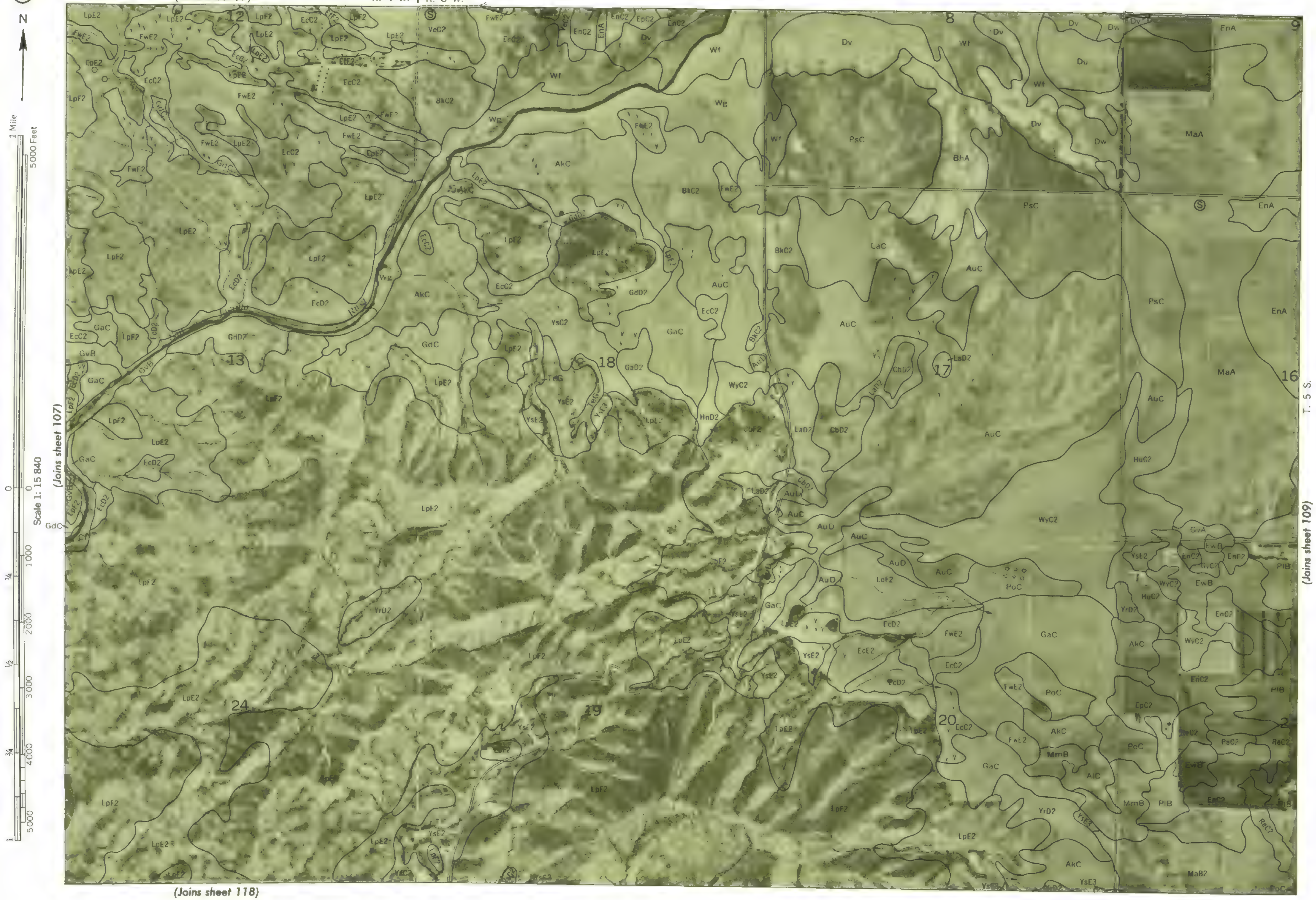
R. 4 W.



This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 107



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 108
Land division corners are approximately positioned on this map.
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

R. 3 W.

(Joins sheet 98)

109

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 109

T. 5 S.

(Joins sheet 108)

(Joins sheet 110)

(Joins sheet 119)

N

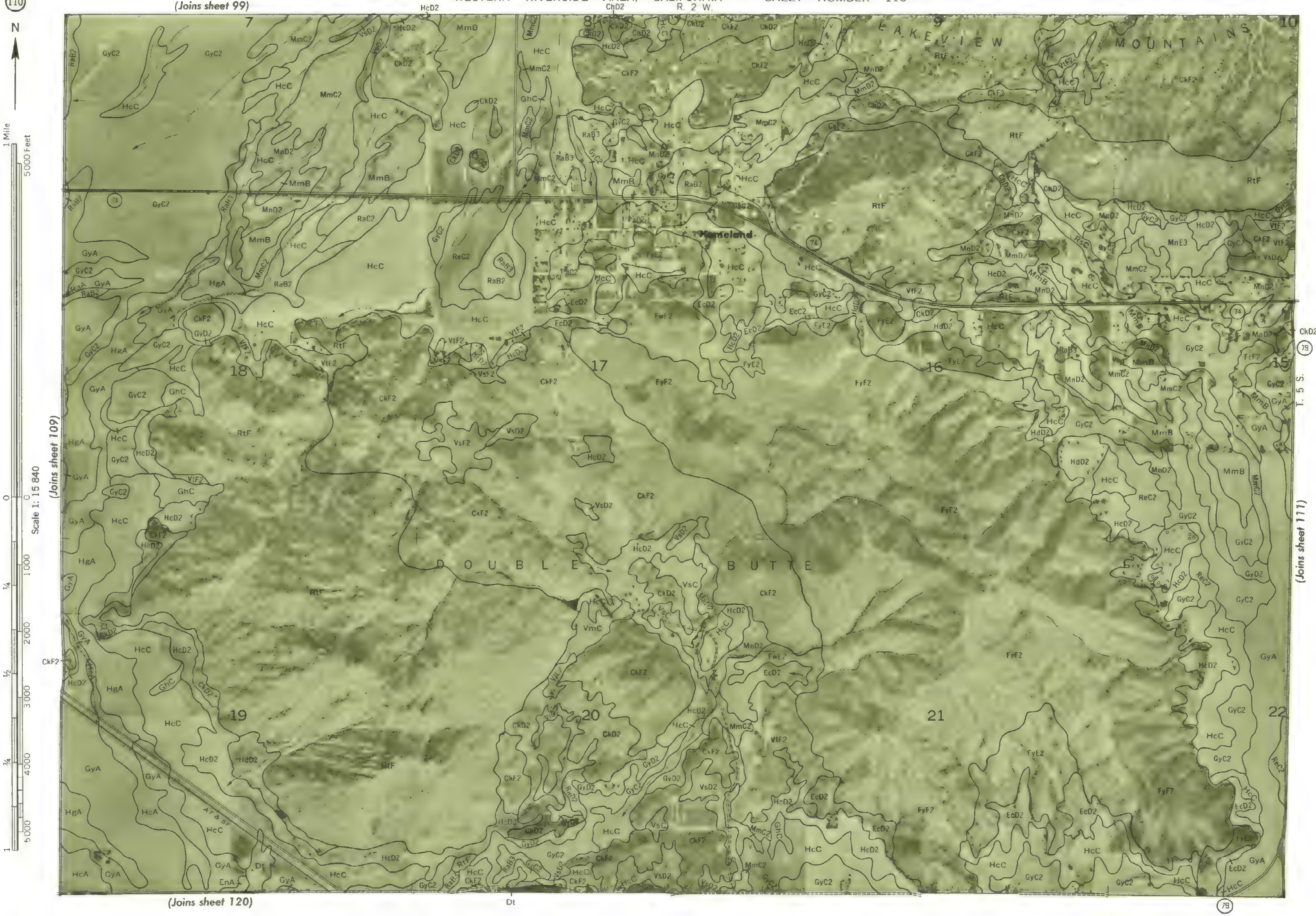
1 Mile

5000 Feet

0 1000 2000 3000 4000 5000

0 ¼ ½ ¾ 1

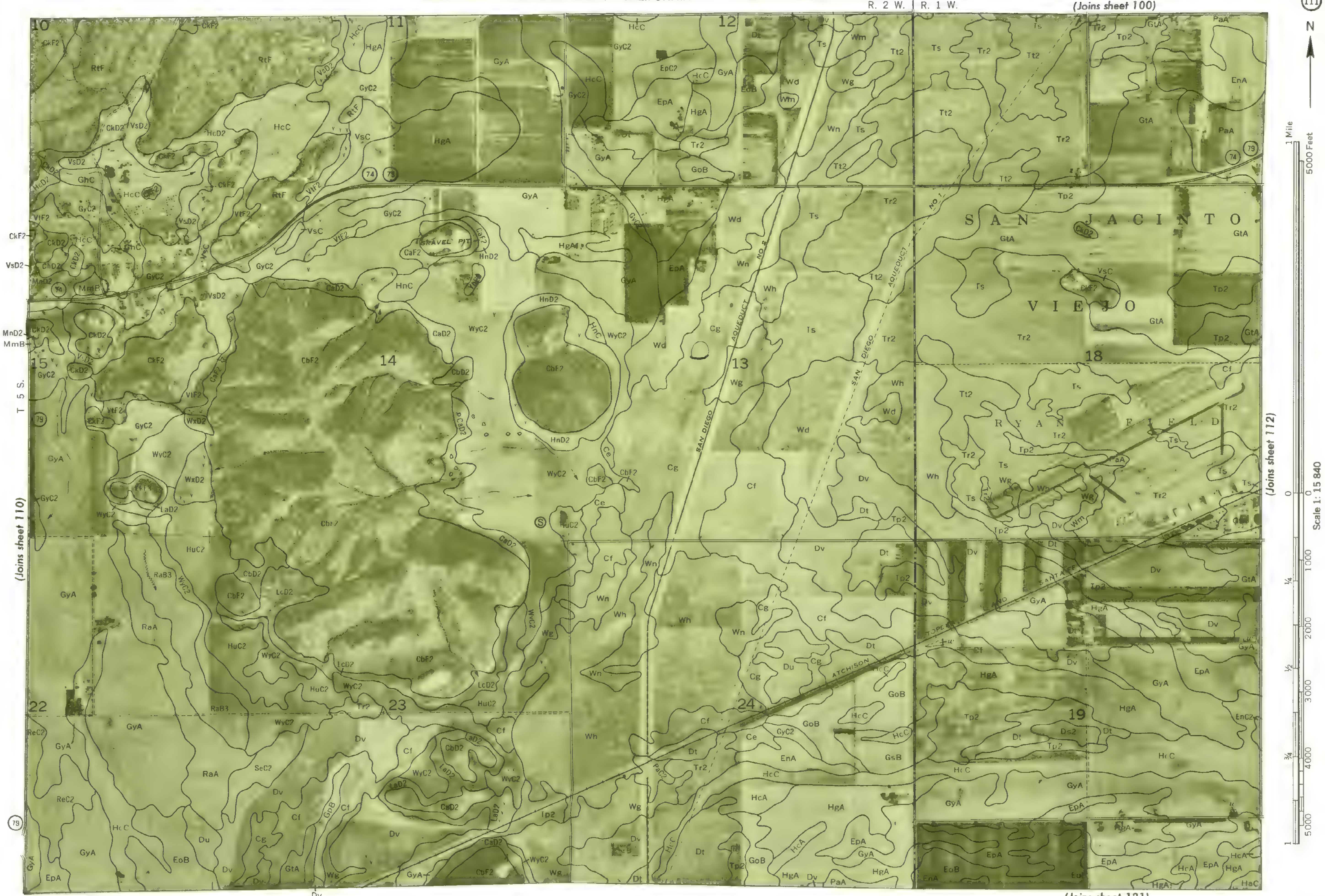
Scale 1: 15 840



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 110

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.



This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

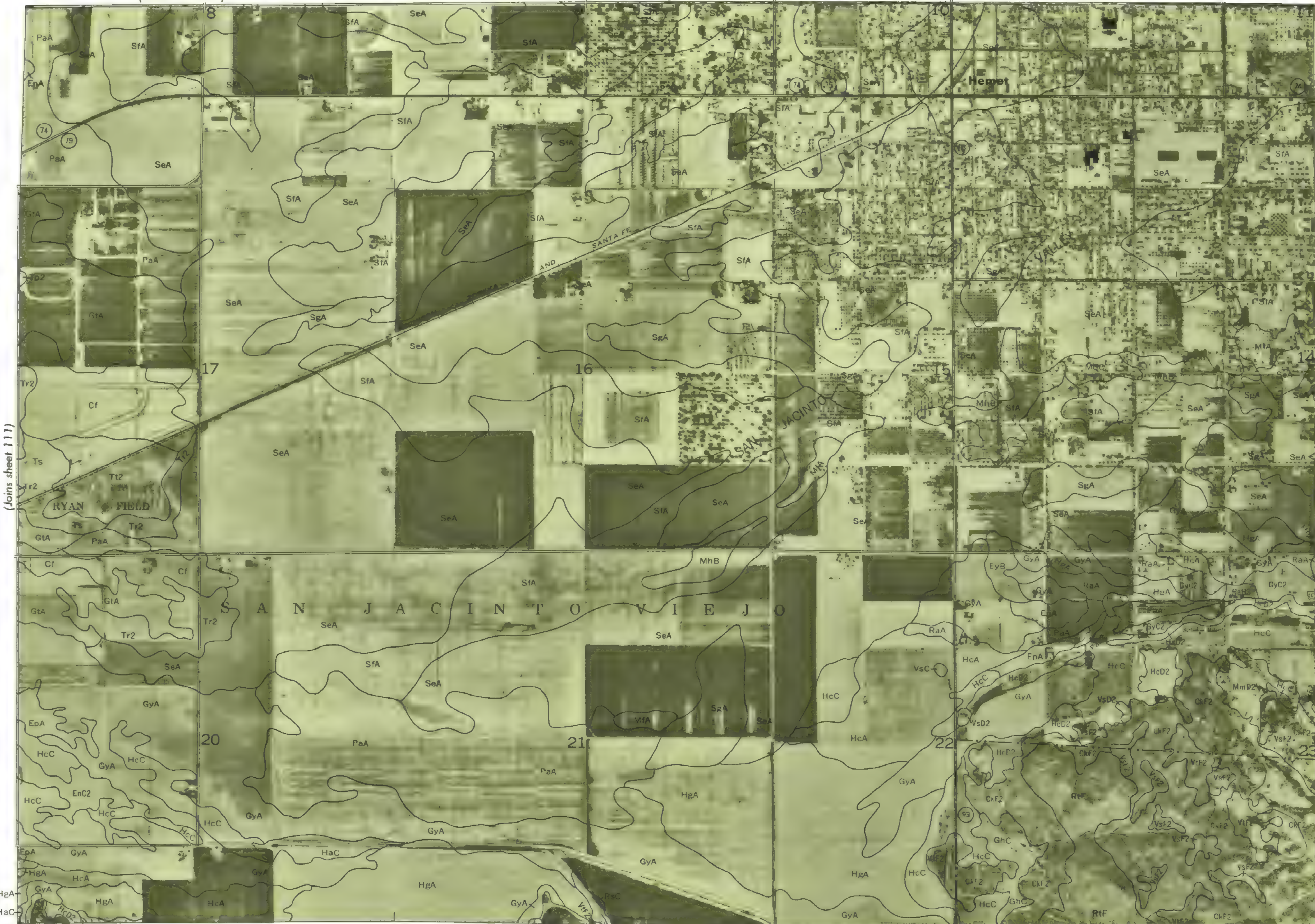
WESTERN RIVERSIDE AREA, CALIFORNIA NO. 111

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 112

(Joins sheet 101)

R. 1 W.

N



1 Mile

5000 Feet

Scale 1: 15 840

(Joins sheet 111)

(Joins sheet 113)

(Joins sheet 122)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 112

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

Land division corners are approximately positioned on this map.

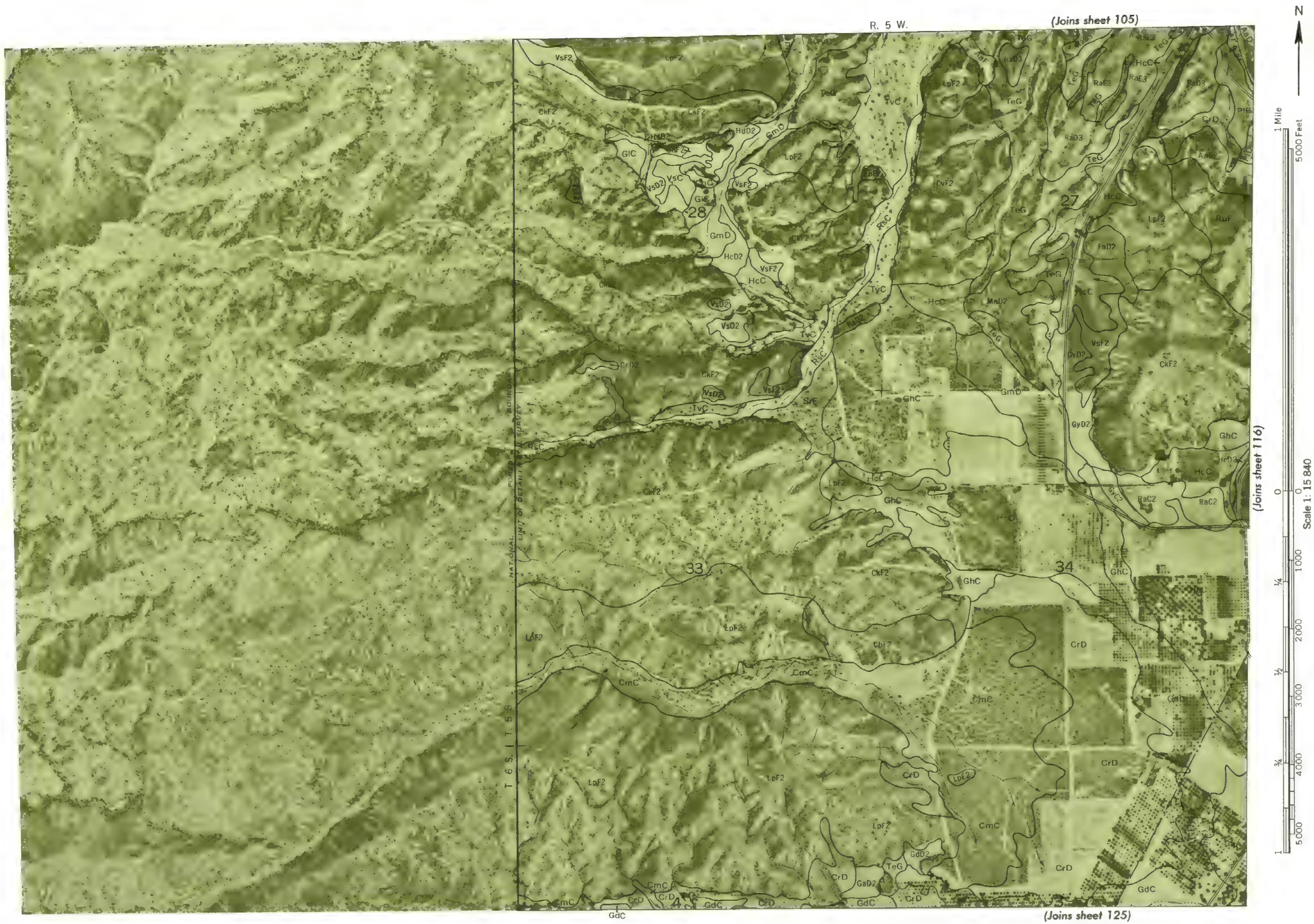
1 Mile
5000 Feet
Scale 1: 15 840

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 114

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 114

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station



This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

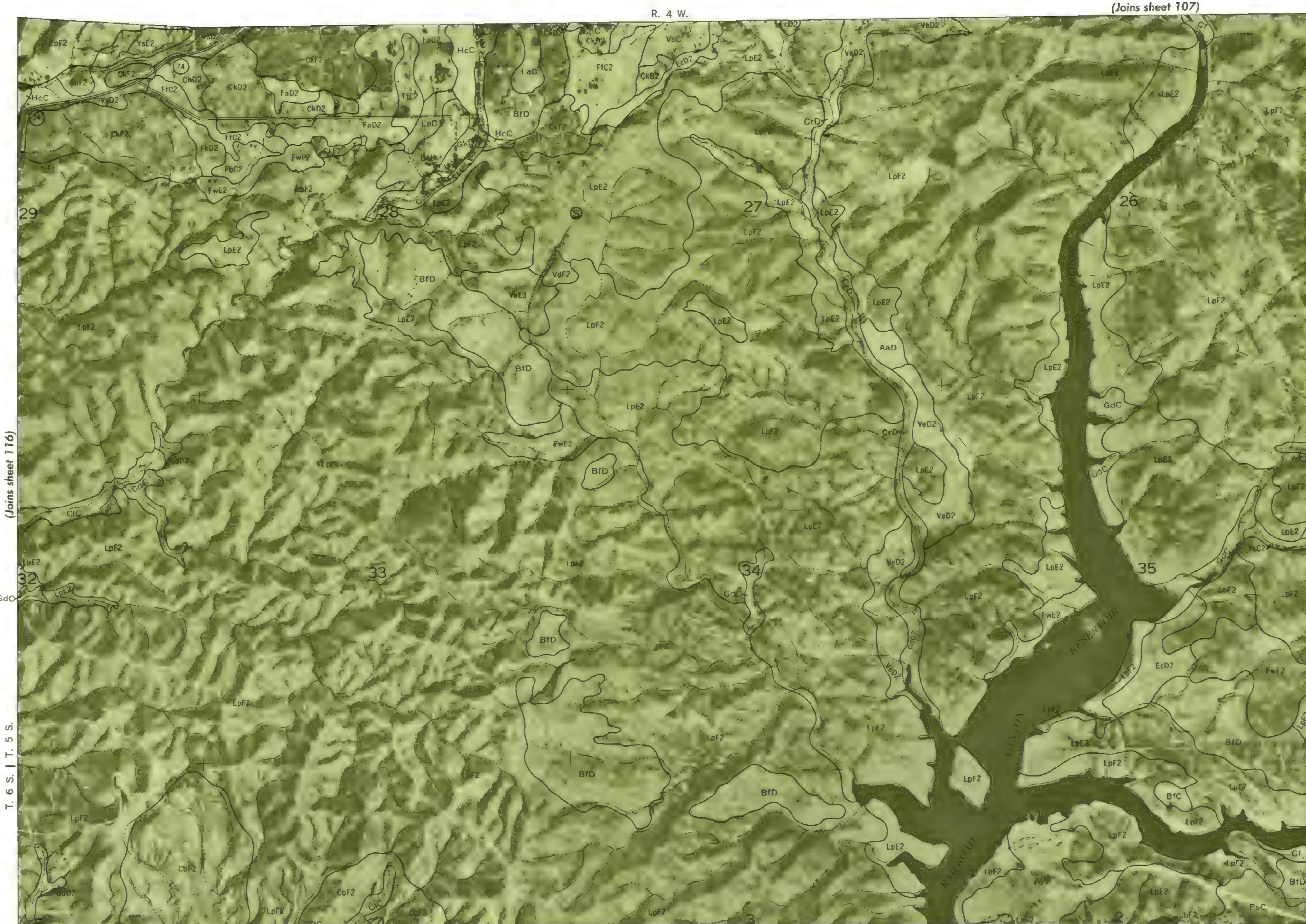
WESTERN RIVERSIDE AREA, CALIFORNIA NO. 115

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 116

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Sta-

R. 4 W.



N

Scale 1: 15 840

1 Mile

5000 Feet

0 1000 2000 3000 4000 5000

0 ¼ ½ ¾ 1

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 117.

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 118

(Joins sheet 108)

R. 4 W. | R. 3 W.

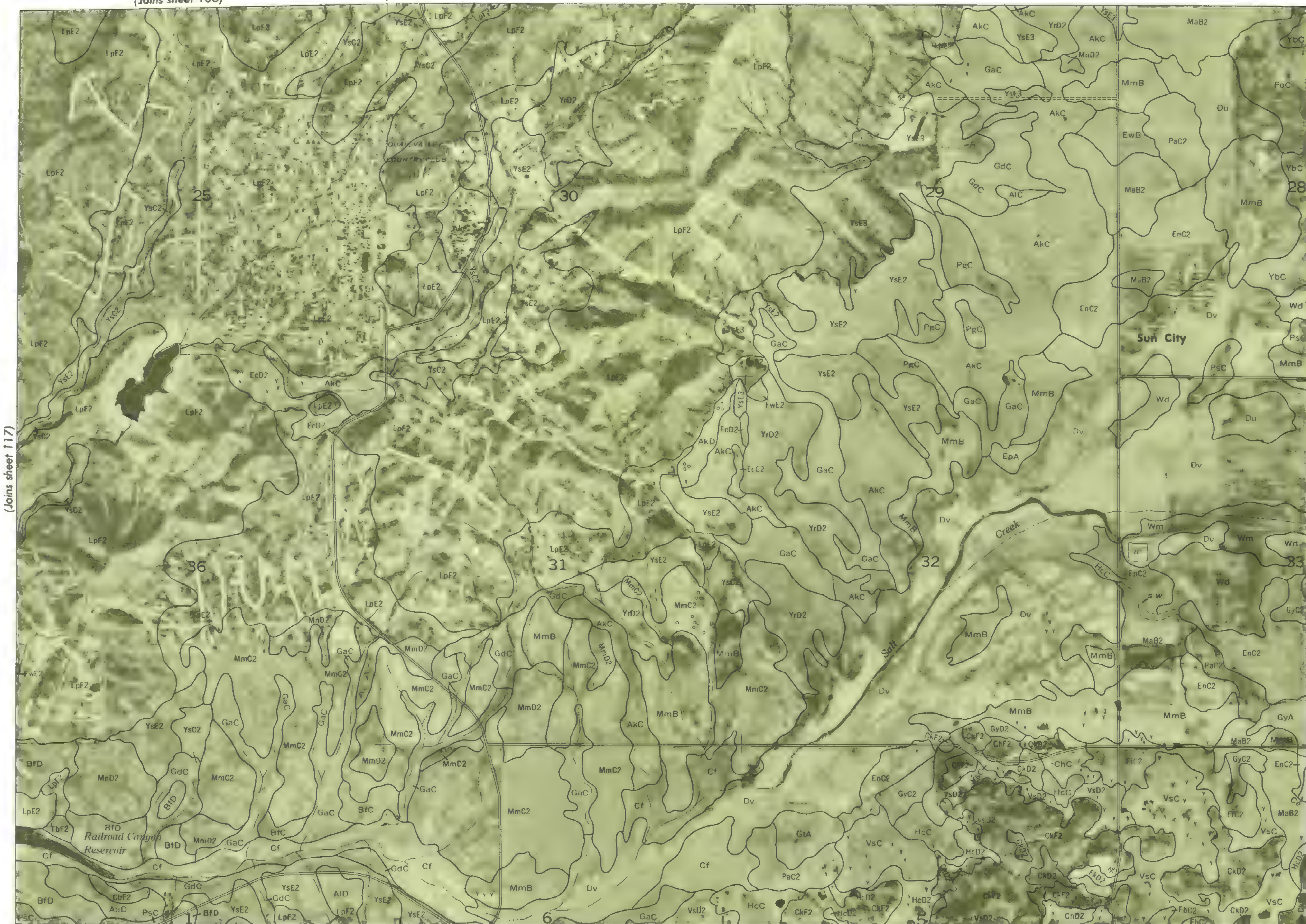
N

Scale 1: 15 840

1 Mile ¾ ½ ¼ 0

5000 Feet 4000 3000 2000 1000 0

(Joins sheet 117)



(Joins sheet 119)

T. 5 S. | T. 6 S.

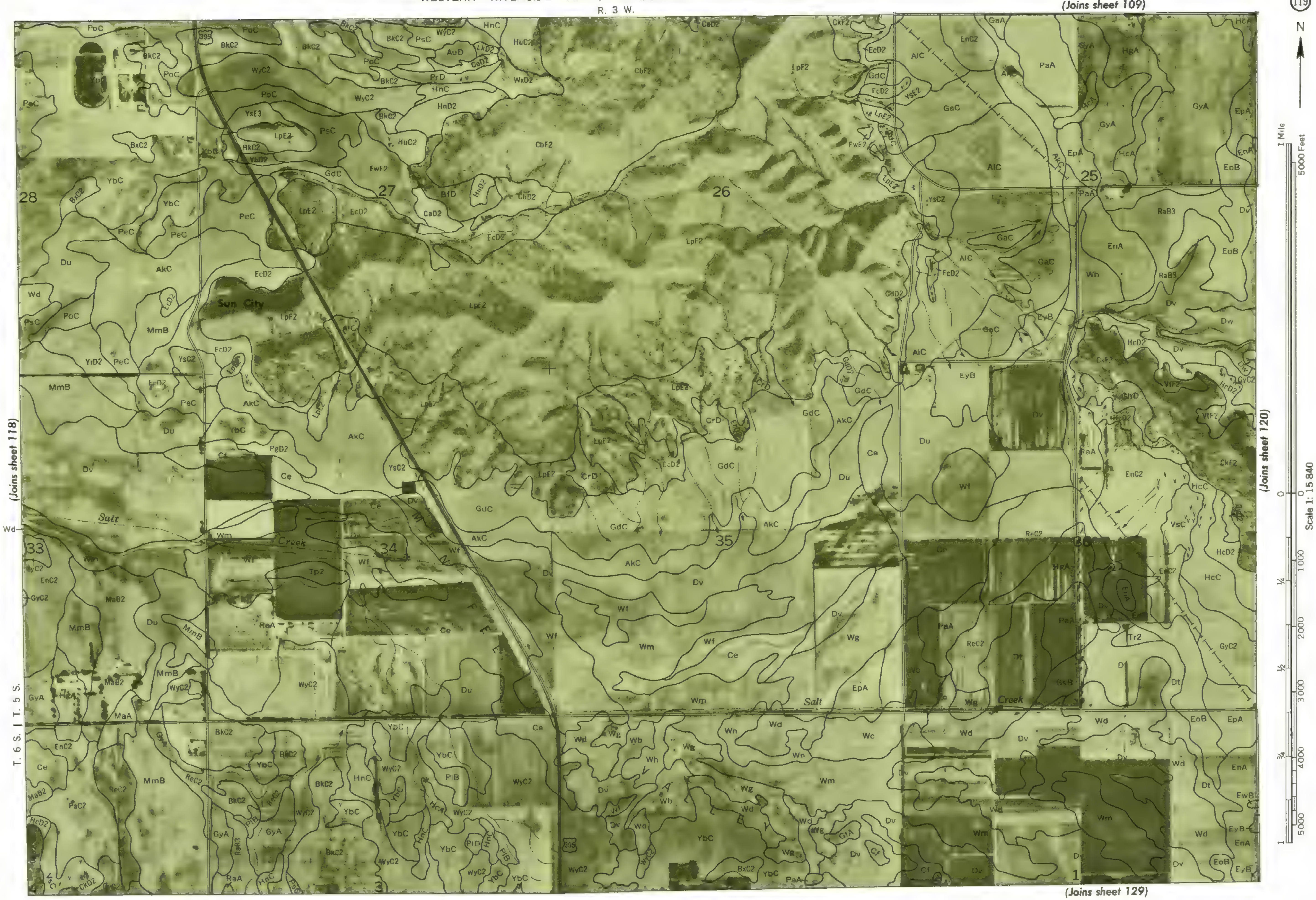
(Joins sheet 128)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 118

Land division corners are approximately positioned on this map

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

119



This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

Land division corners are approximately positioned on this map.

120

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 120

R. 2 W.

(Joins sheet 110)

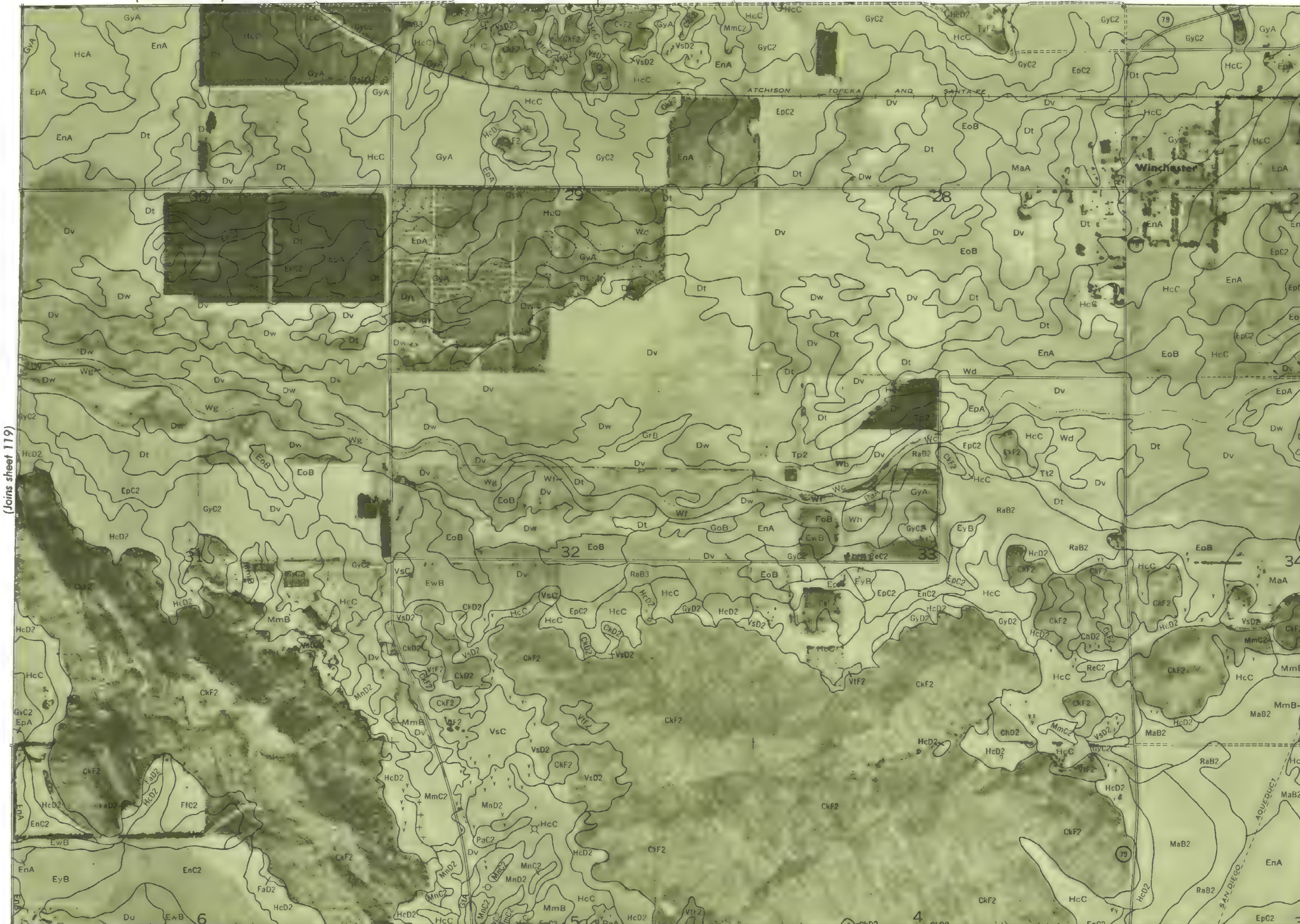
N

1 Mile

5000 Feet

Scale 1: 15 840

(Joins sheet 119)



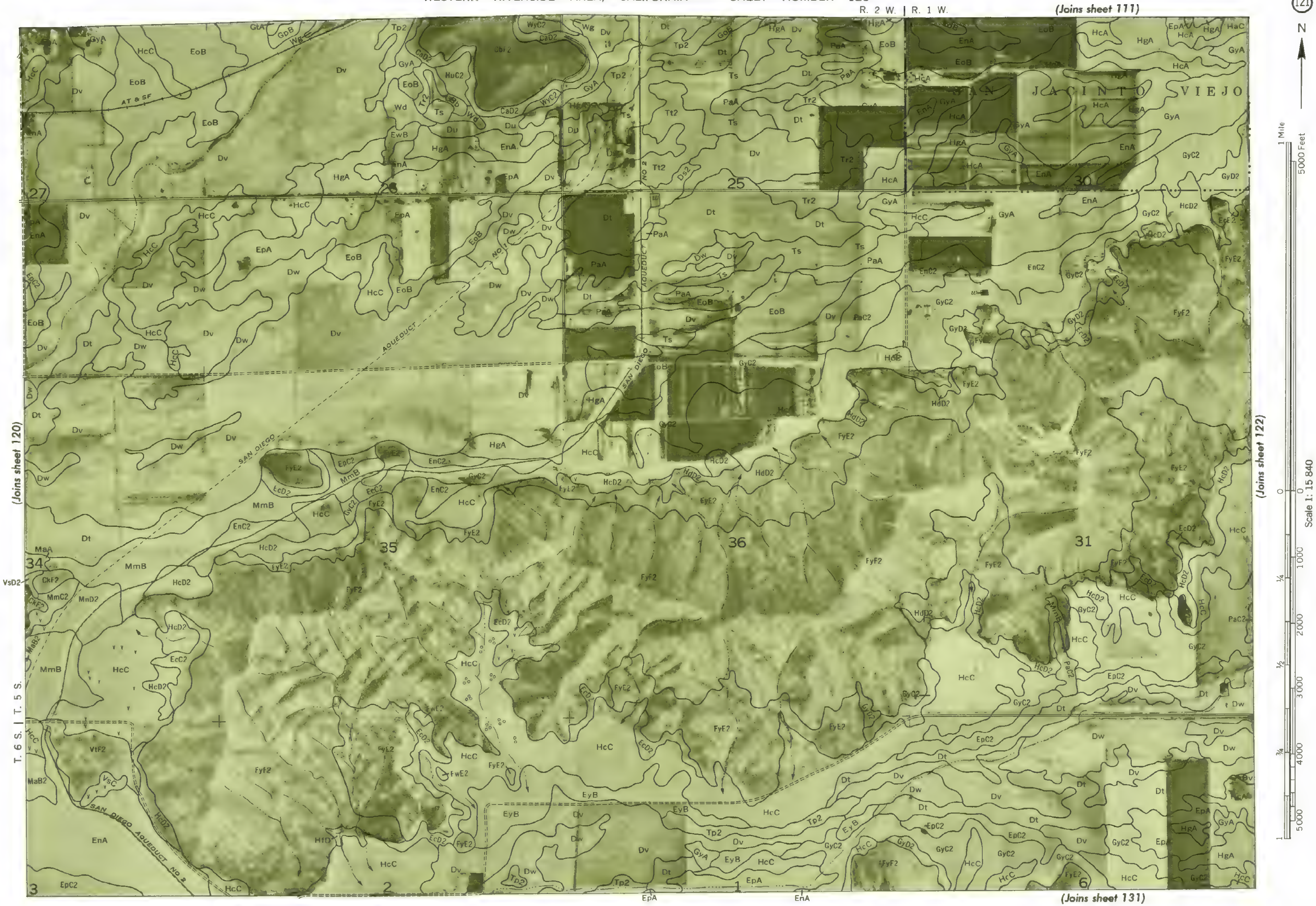
(Joins sheet 121)

(Joins sheet 130)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 120

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.



This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land divisions on corners are approximately positioned on this map.

(122)

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 122

(Joins sheet 112)

R. 1 W.

N

Scale 1: 15 840

1 Mile

5000 Feet

0 0 1000 2000 3000 4000 5000

0 ¼ ½ ¾ 1

(Joins sheet 121)

(Joins sheet 123)

T. 5 S. | T. 6 S.

(Joins sheet 132)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 122

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

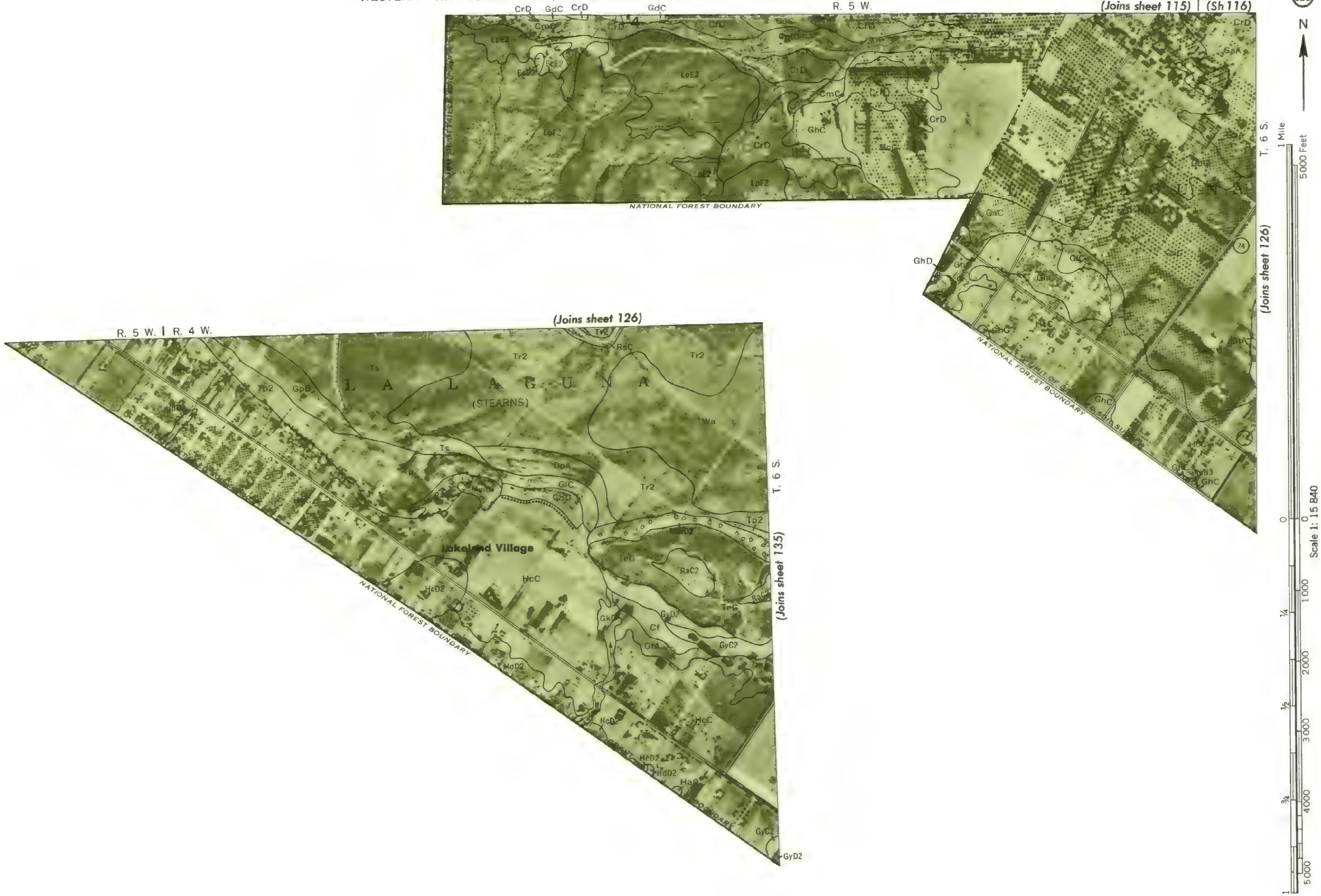
WESTERN RIVERSIDE AREA, CALIFORNIA NO. 123

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 124

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 124

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station



This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 125

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 126

WESTERN RIVERSIDE AREA, CALIFORNIA, NO. 126

Land division corners are approximately positioned on this map

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

127

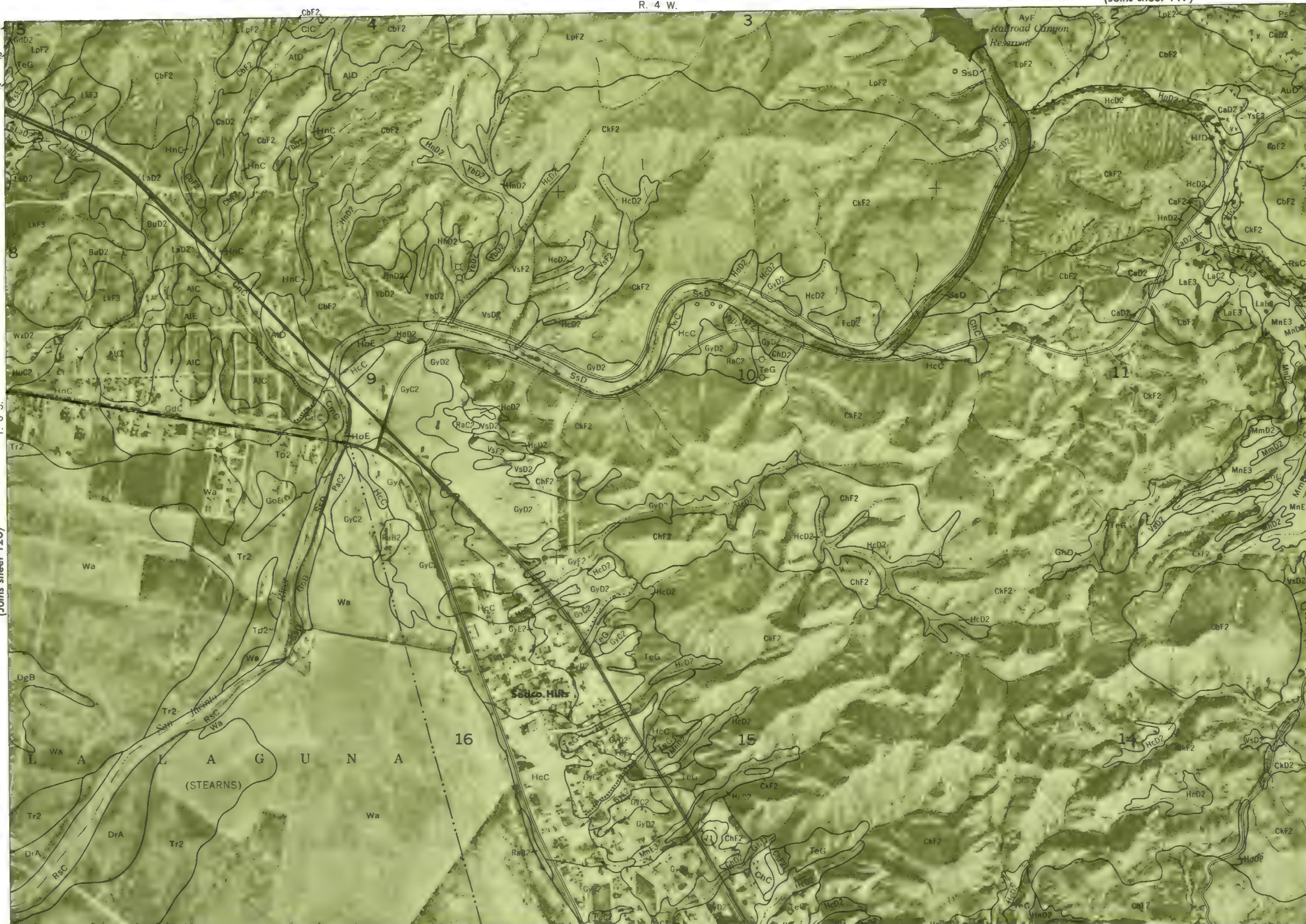
(Joins sheet 117)

R. 4 W.

T. 6 S.

(Joins sheet 126)

(Joins sheet 128)



(Joins sheet 135)

N

Scale 1: 15 840

1 Mile

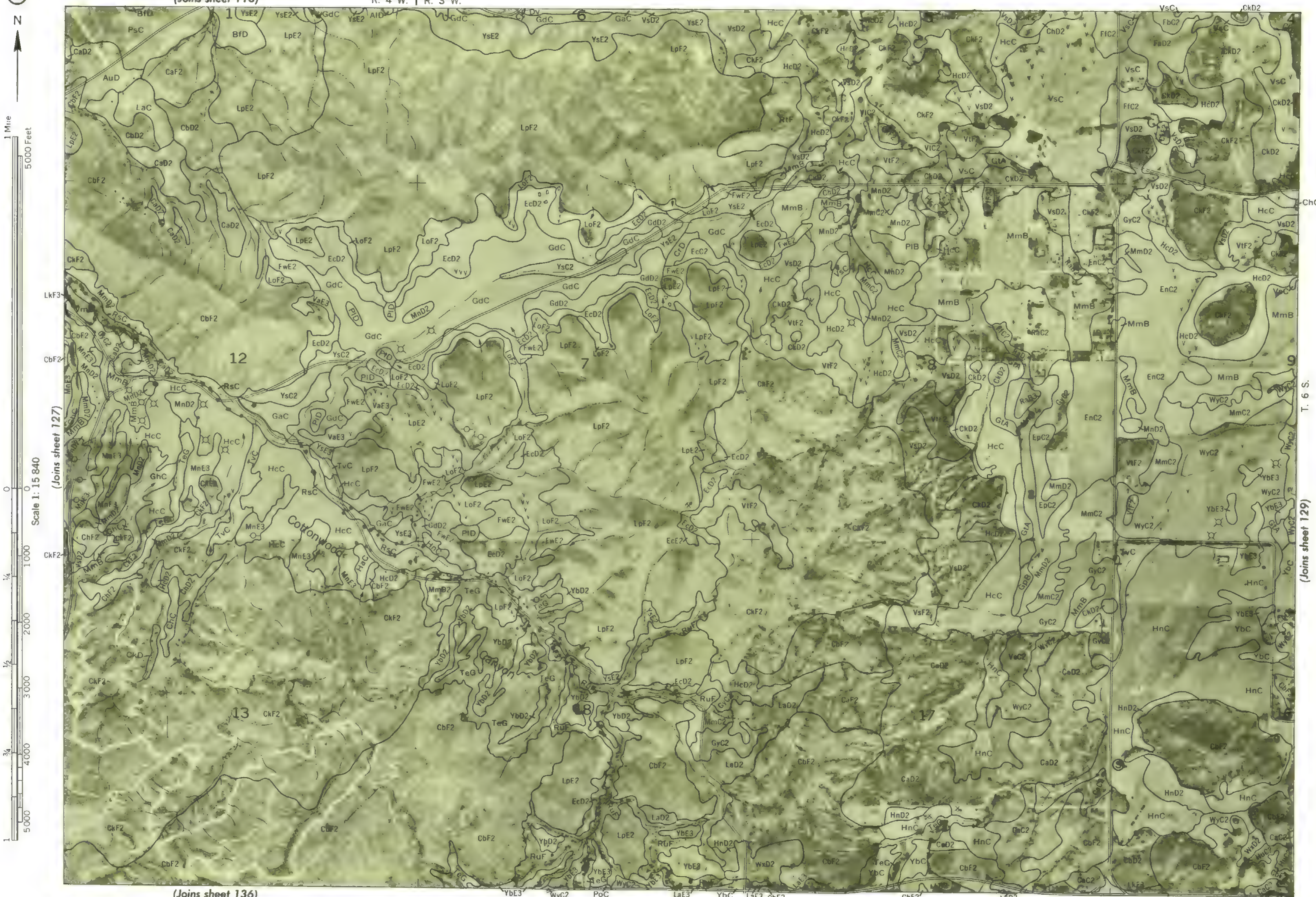
5000 Feet

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 127

Land division corners are approximately positioned on this map

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 128



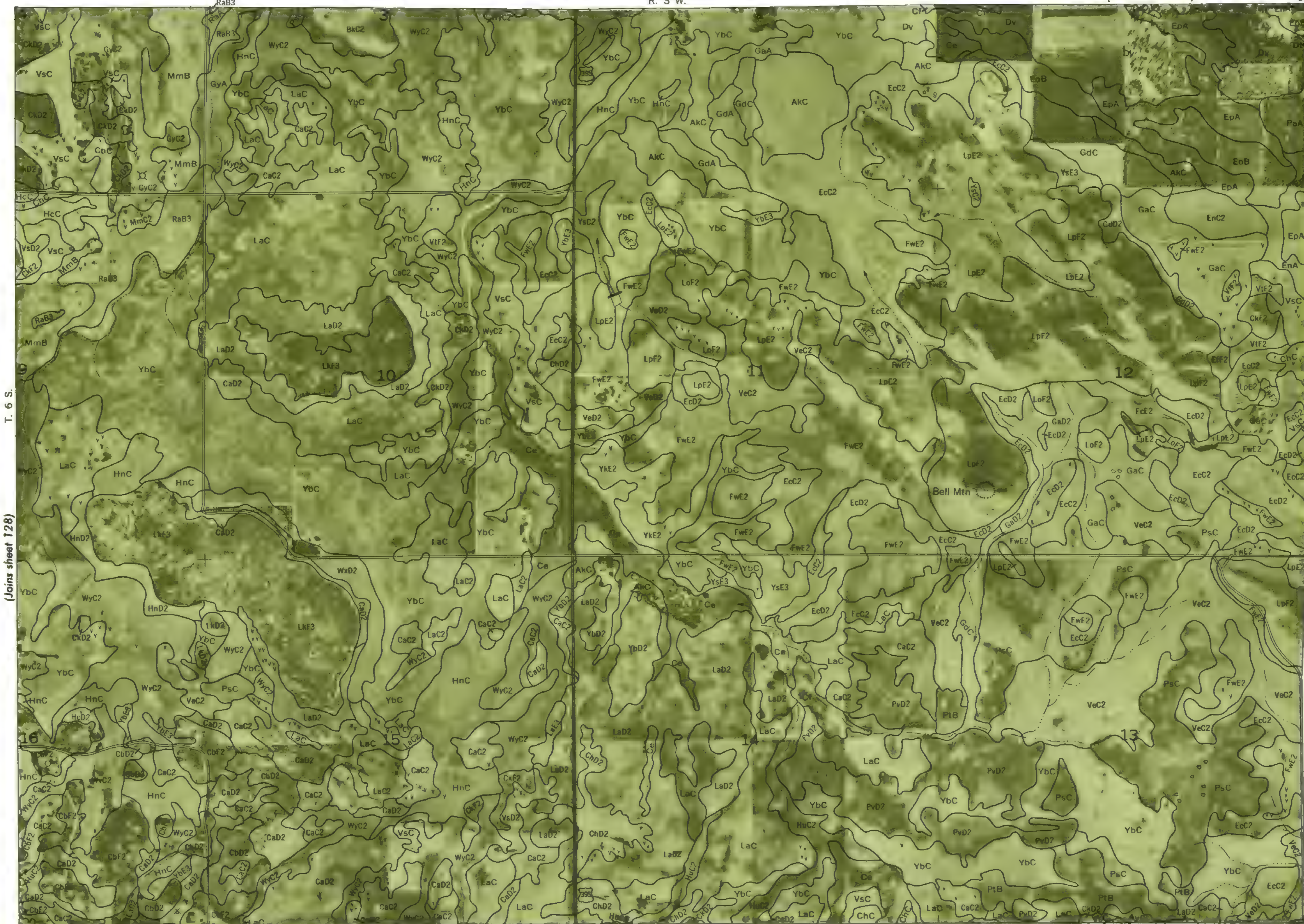
WESTERN RIVERSIDE AREA, CALIFORNIA NO. 128

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

R. 3 W.

(Joins sheet 119)



(Joins sheet 128)

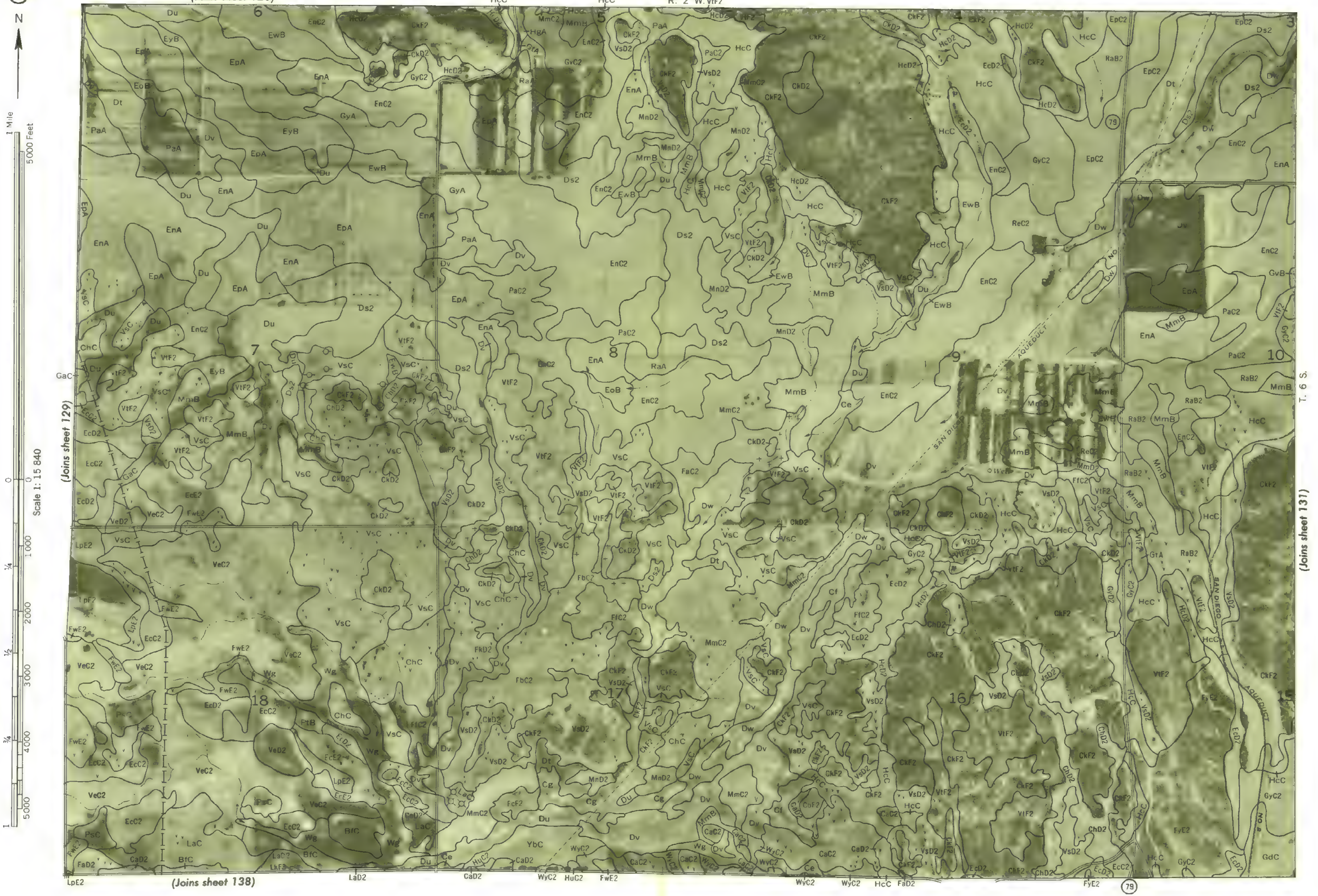
(Joins sheet 130)

(Joins sheet 137)

This map is one of a set compiled in 1959 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 129



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 130

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

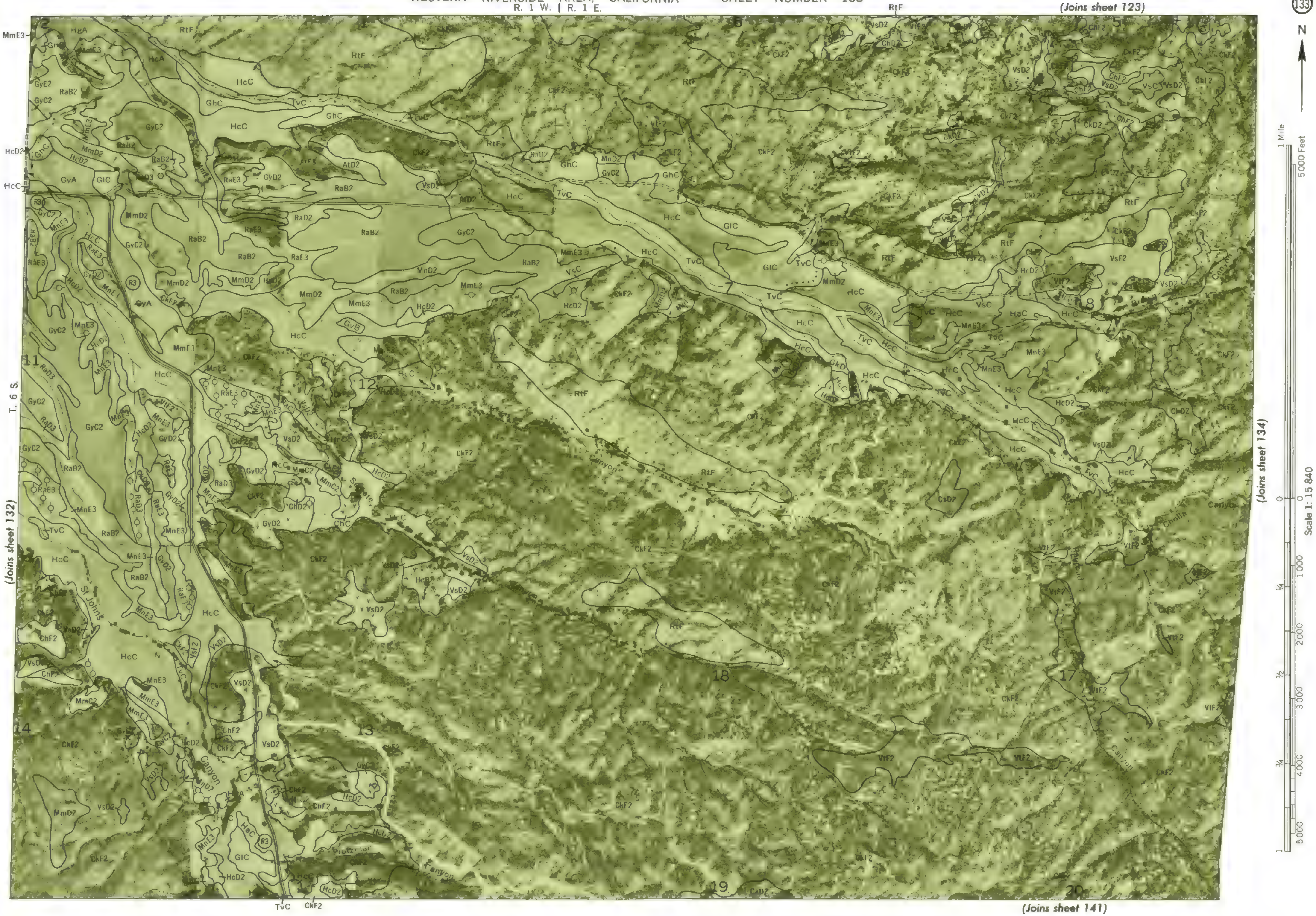
Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 132

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 132

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

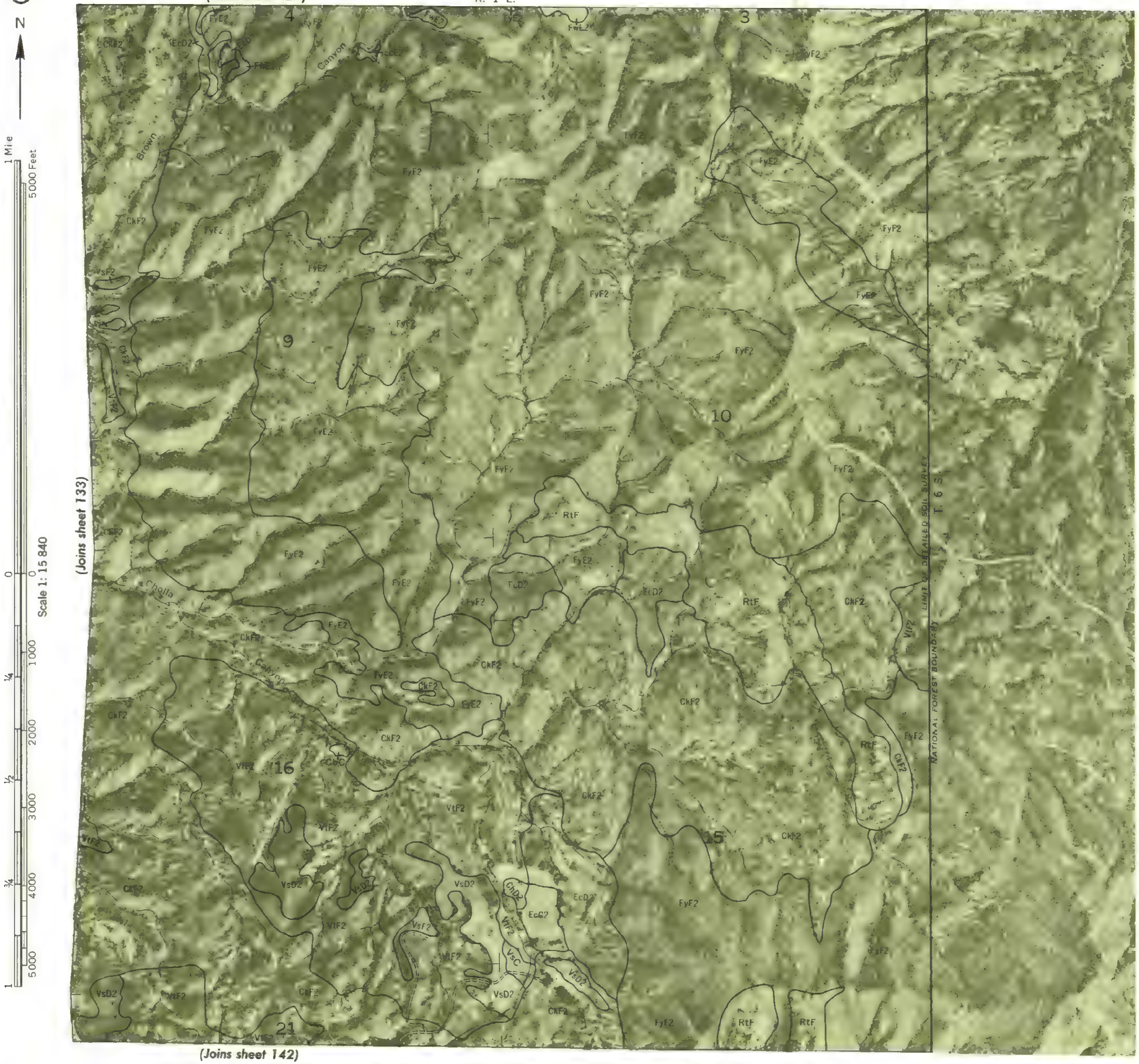


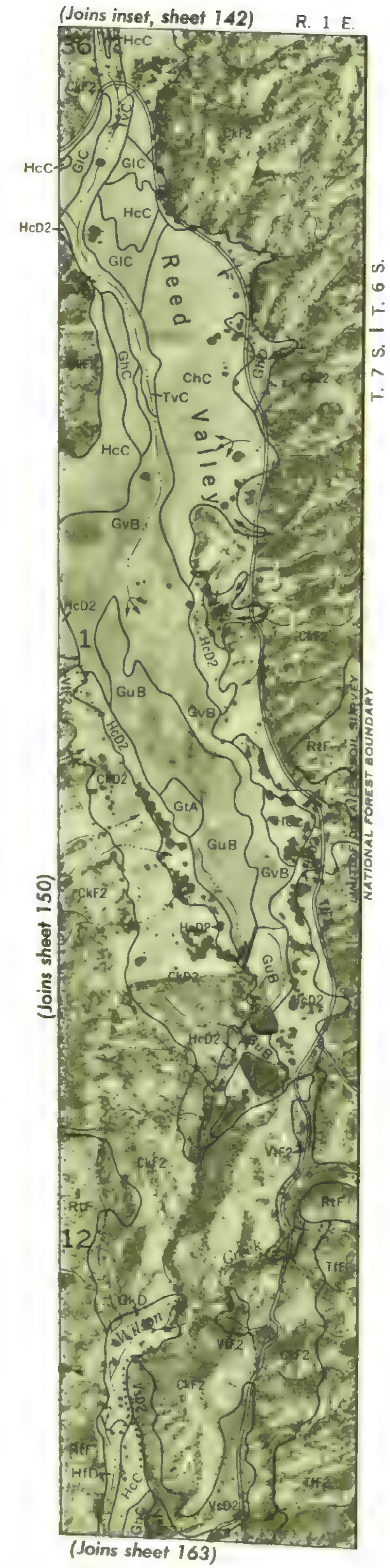
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 133

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 134





WESTERN RIVERSIDE AREA, CALIFORNIA NO. 134

Land division corners are approximately positioned on this map.

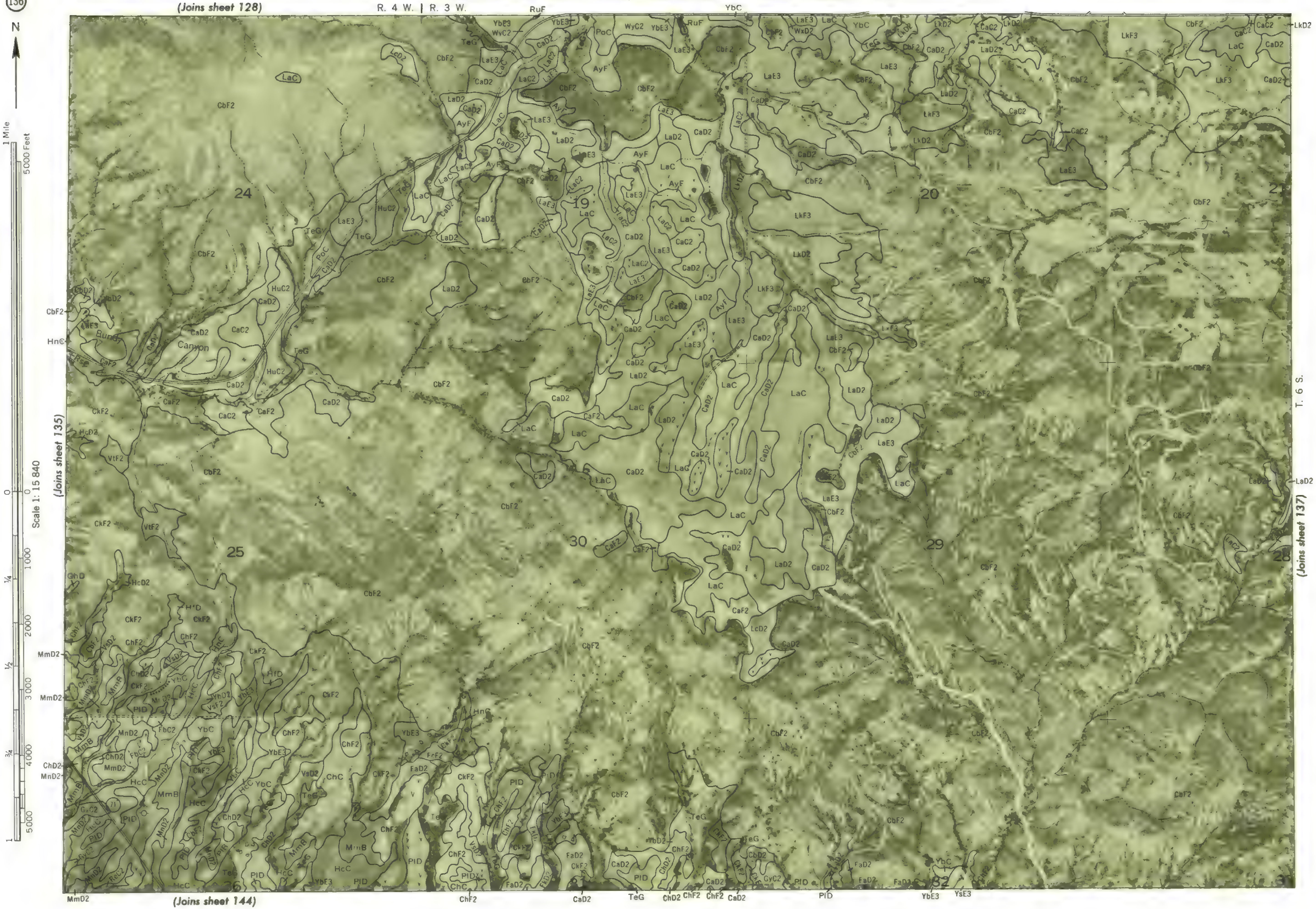
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 135

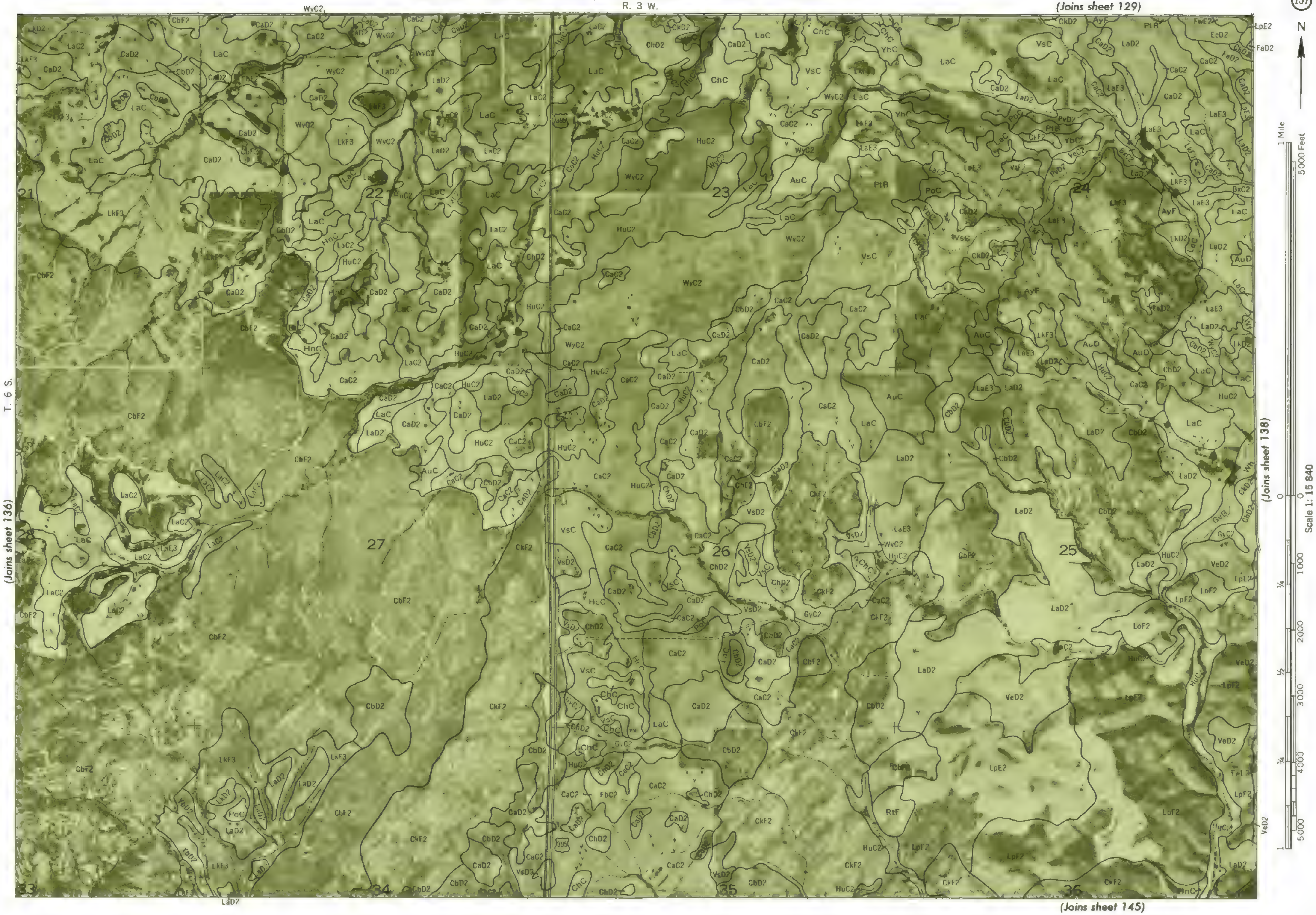
WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 136



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 136

Land division corners are approximately positioned on this map.

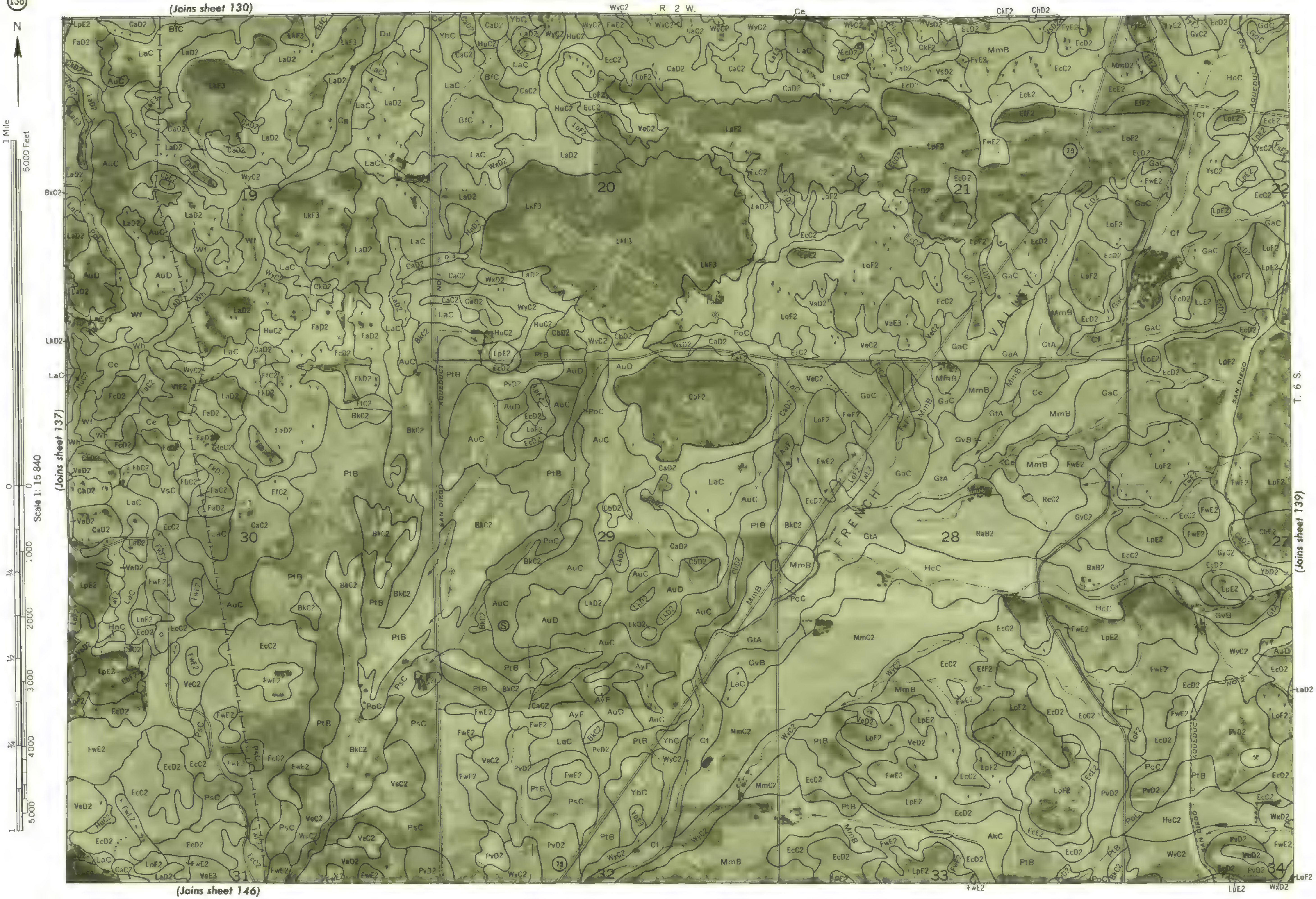
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station



This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 138



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 138

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 139

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 140

(Joins sheet 132)

R. 1 W.

N

Scale 1: 15 840

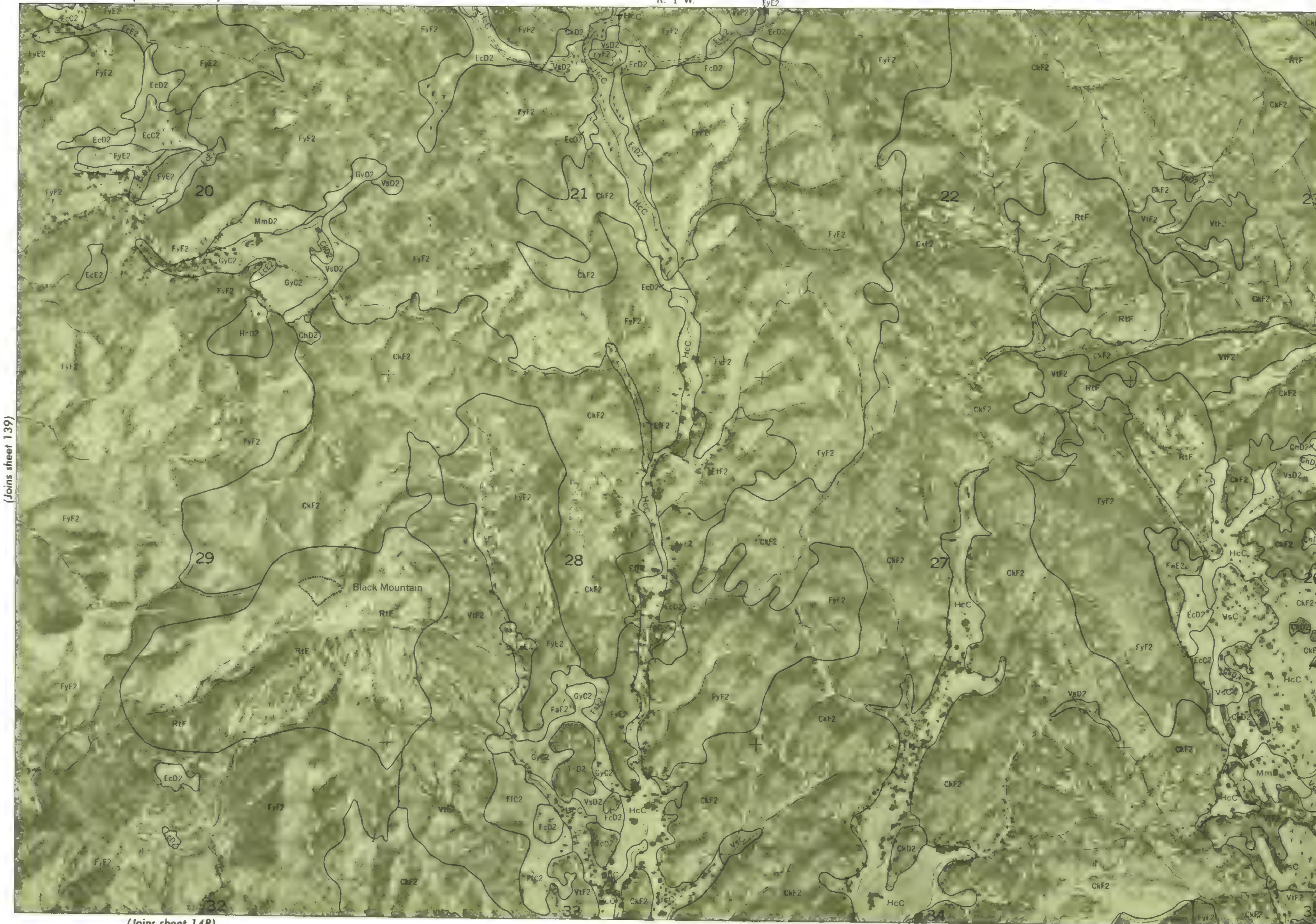
1 Mile

5000 Feet

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

(Joins sheet 139)



T. 6 S.

(Joins sheet 141)

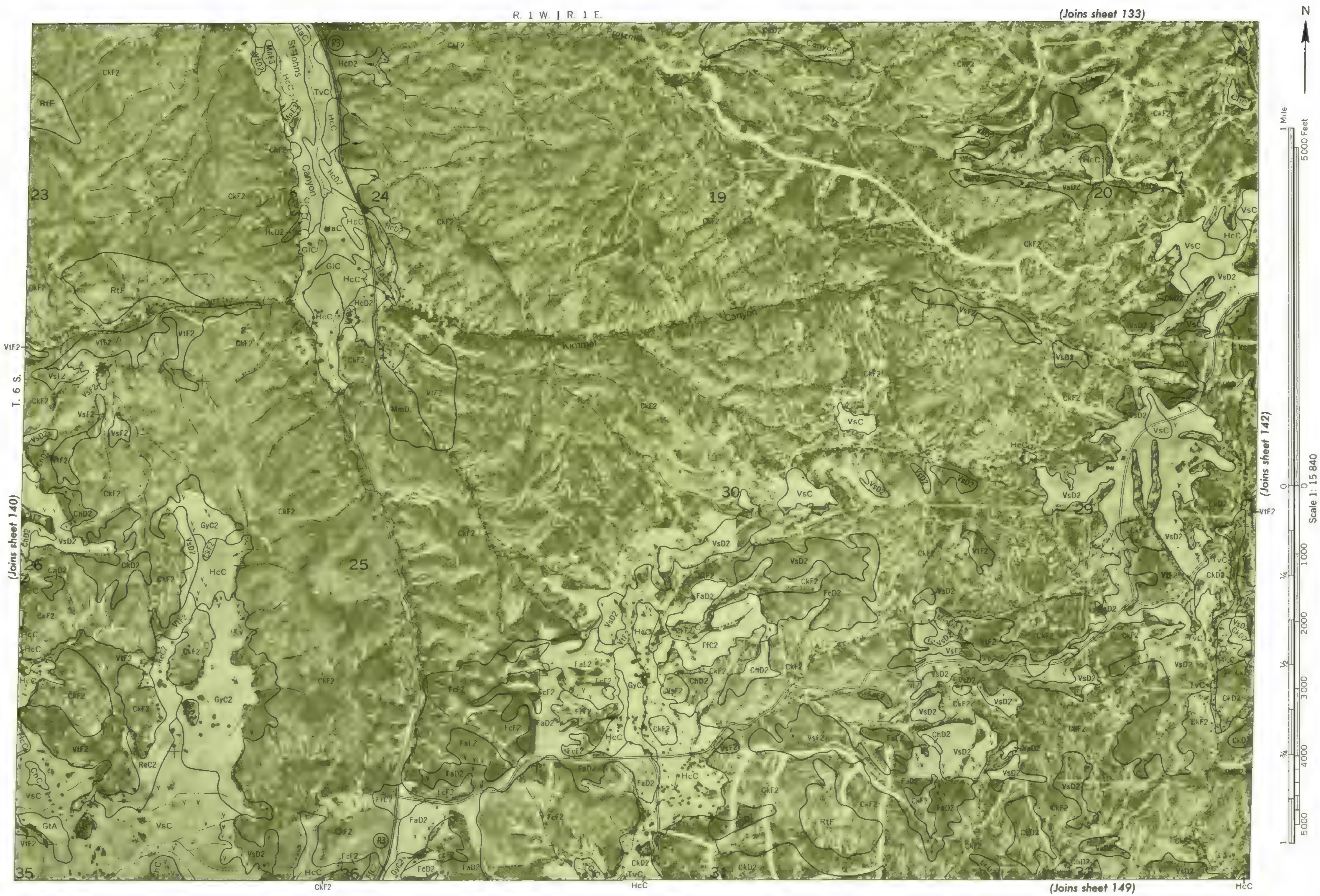
(149)

(Joins sheet 148)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 140

Land division corners are approximately positioned on this map

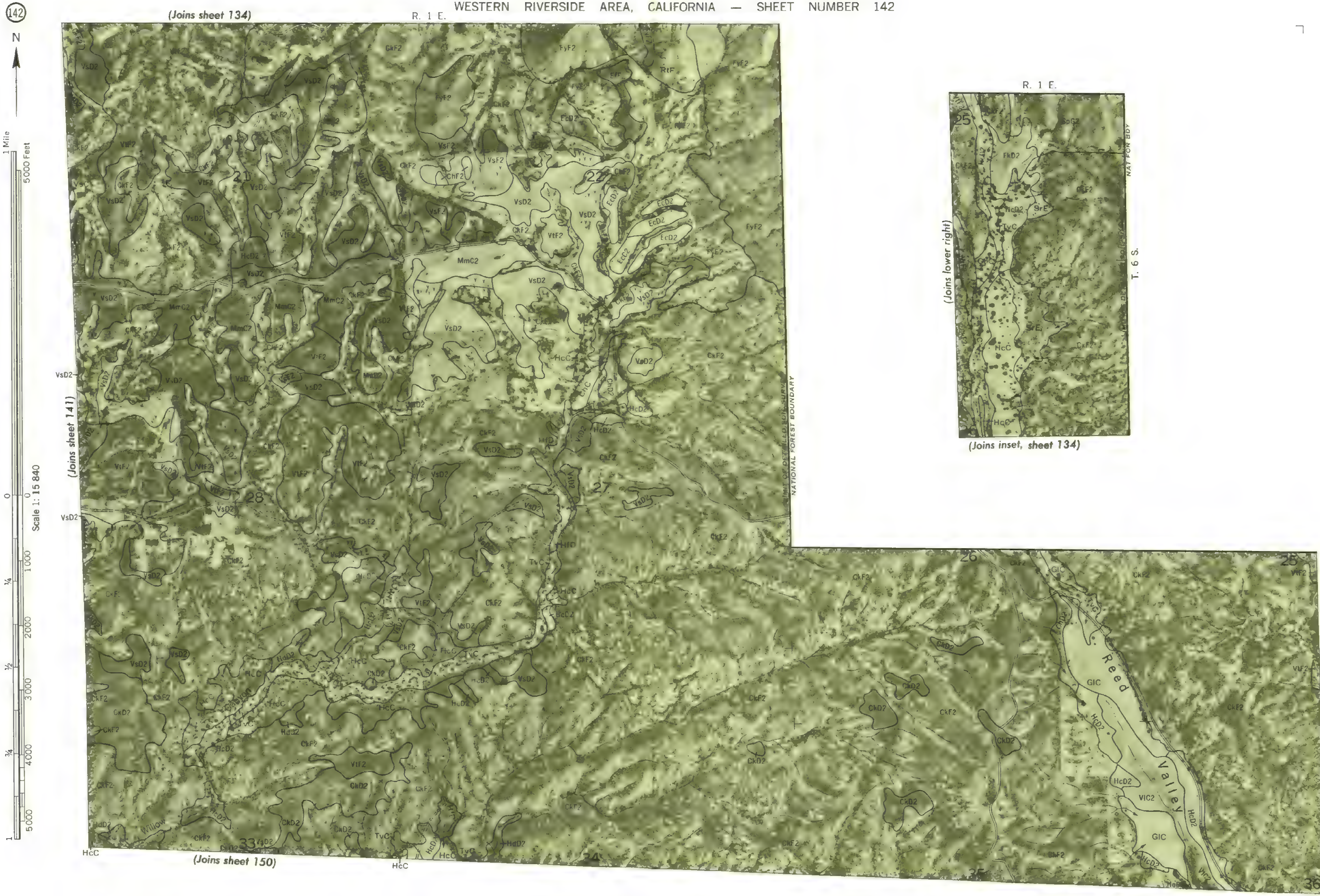
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 141

Land division corners are approximately positioned on this map.

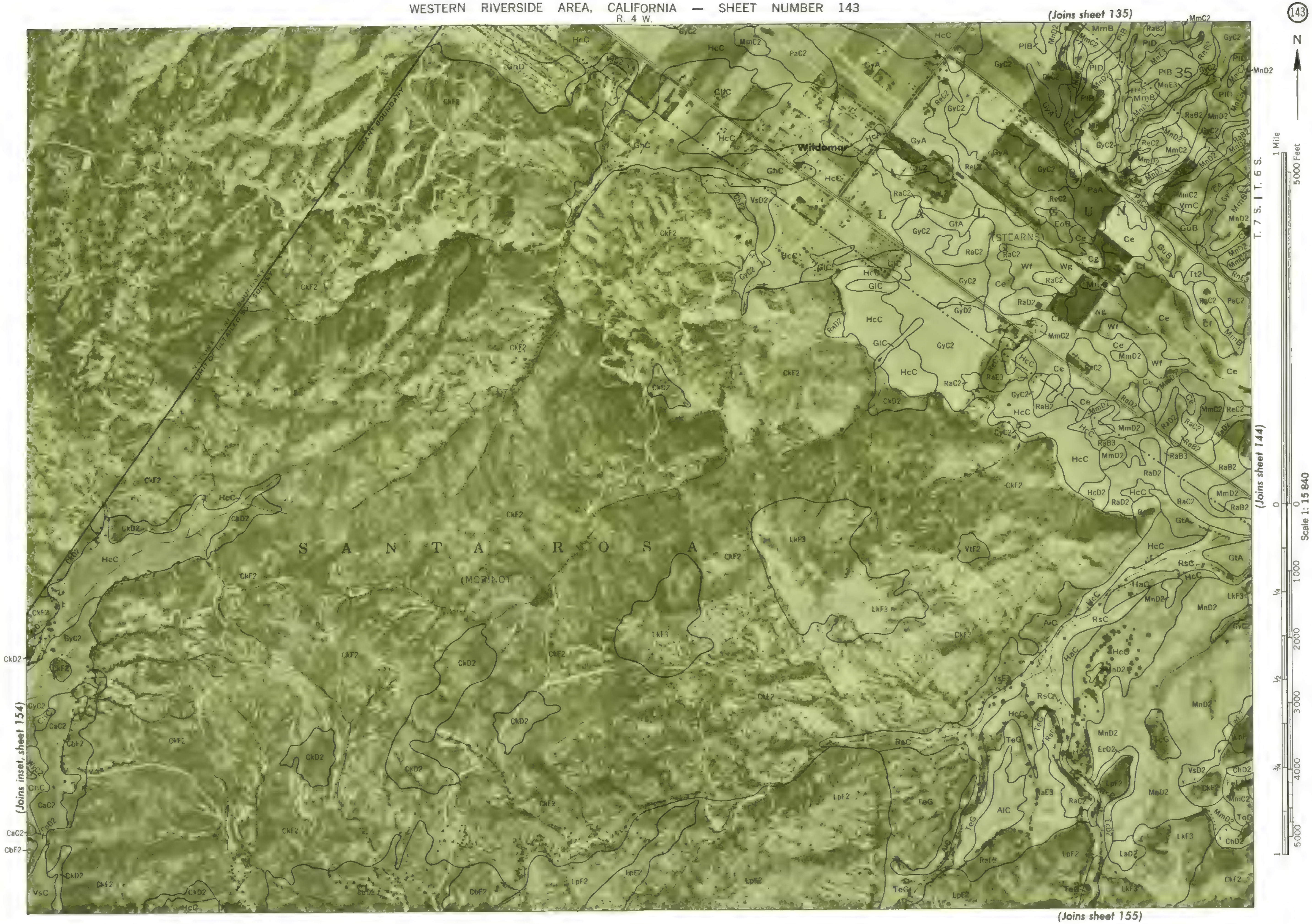
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 142

Land division corners are approximately positioned on this map.

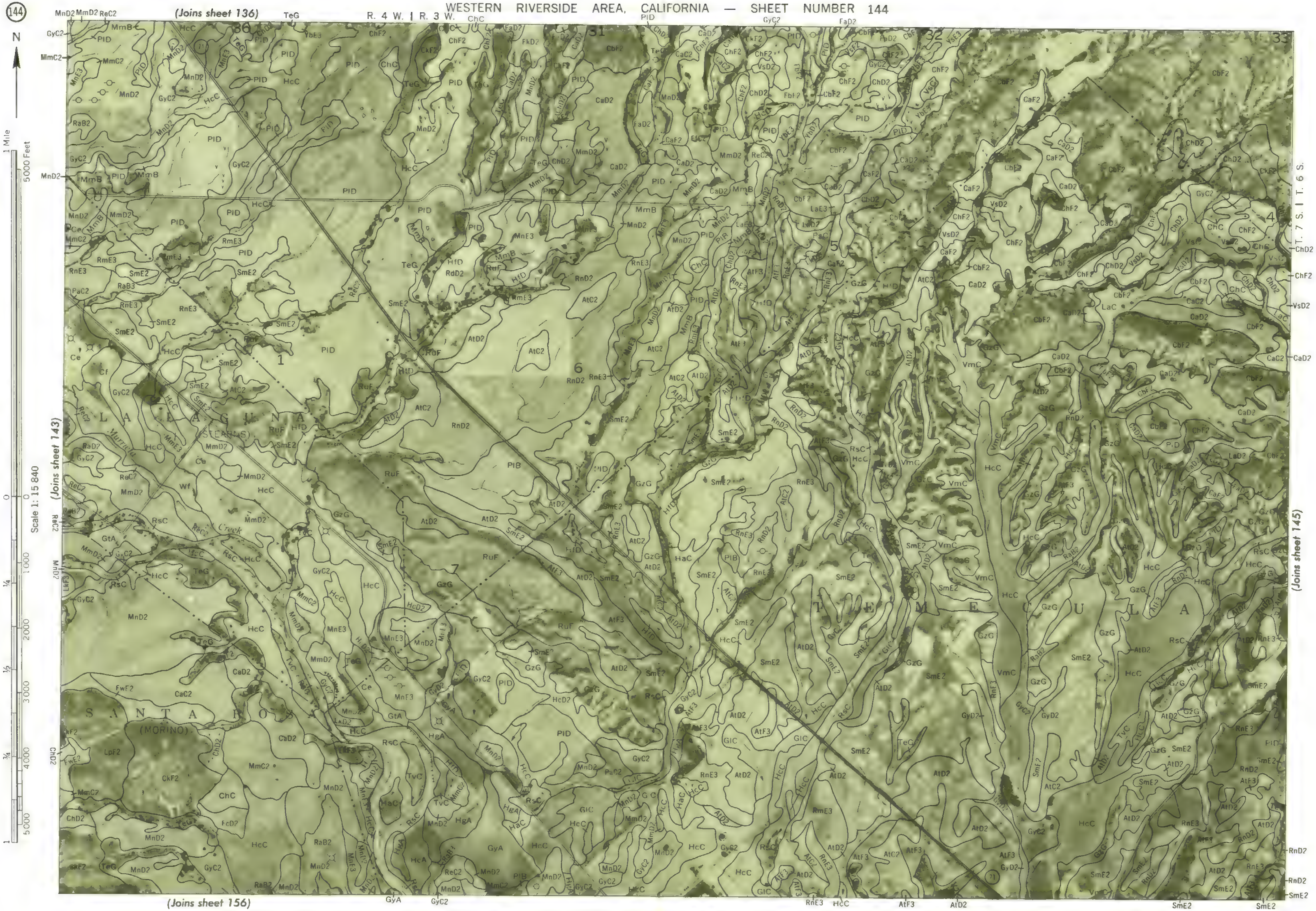
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station



This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 143



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 144

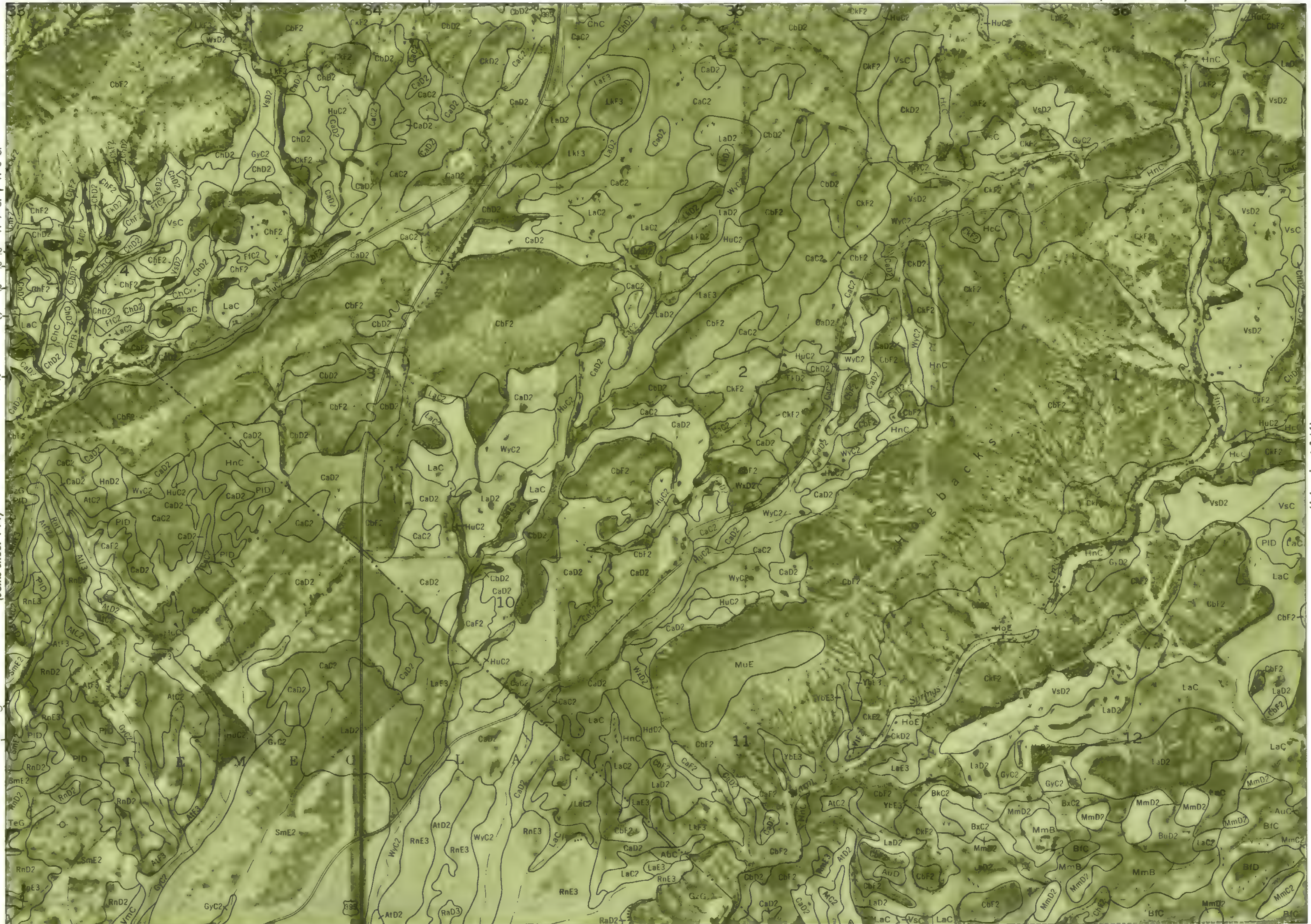
Land division corners are approximately positioned on this map

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

(145)

R. 3 W.

(Joins sheet 137)



N

Scale 1: 15 840

1 Mile

5000 Feet

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

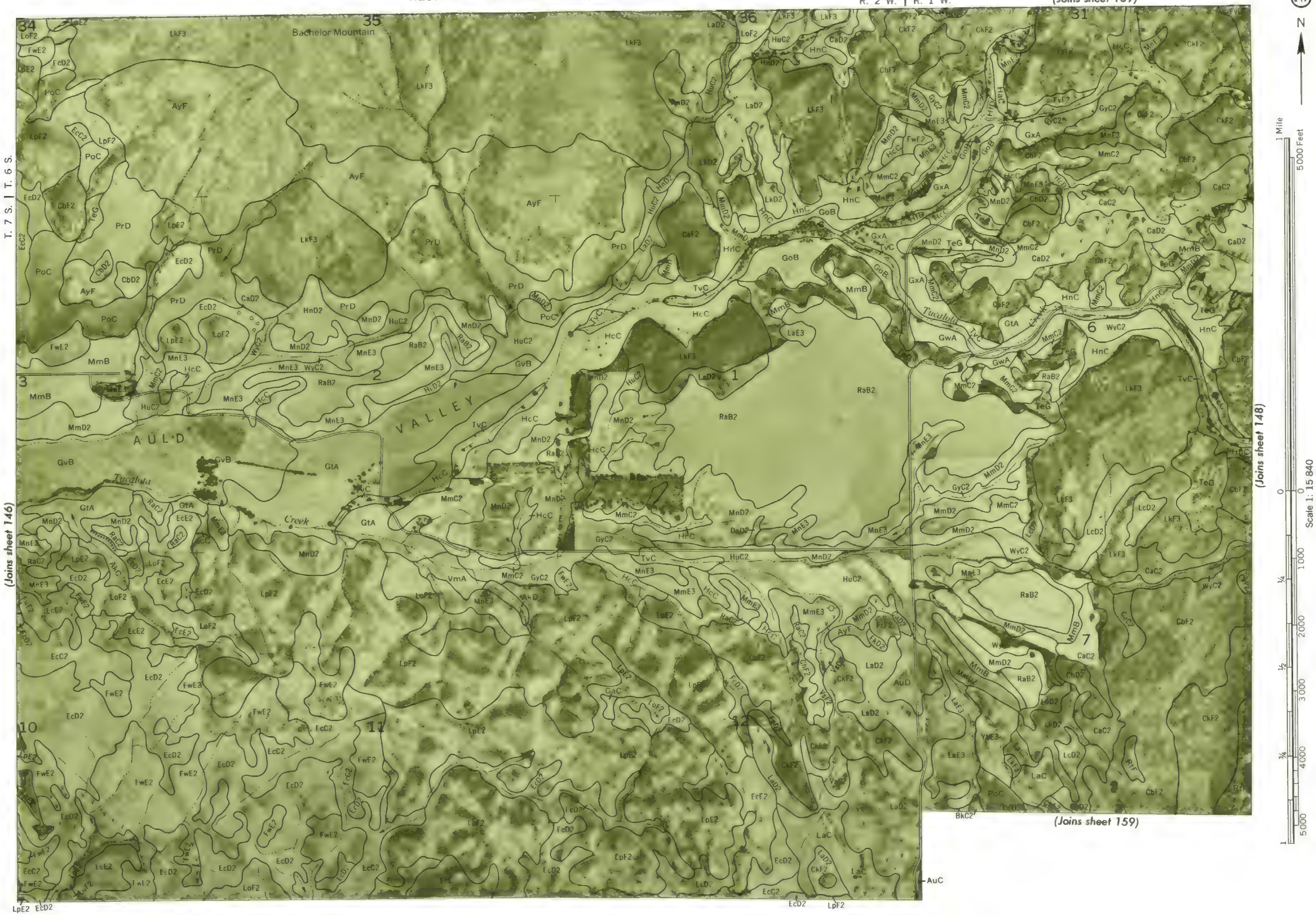
WESTERN RIVERSIDE AREA, CALIFORNIA NO. 145

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 146

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 146

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.



This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

Land division corners are approximately positioned on this map.

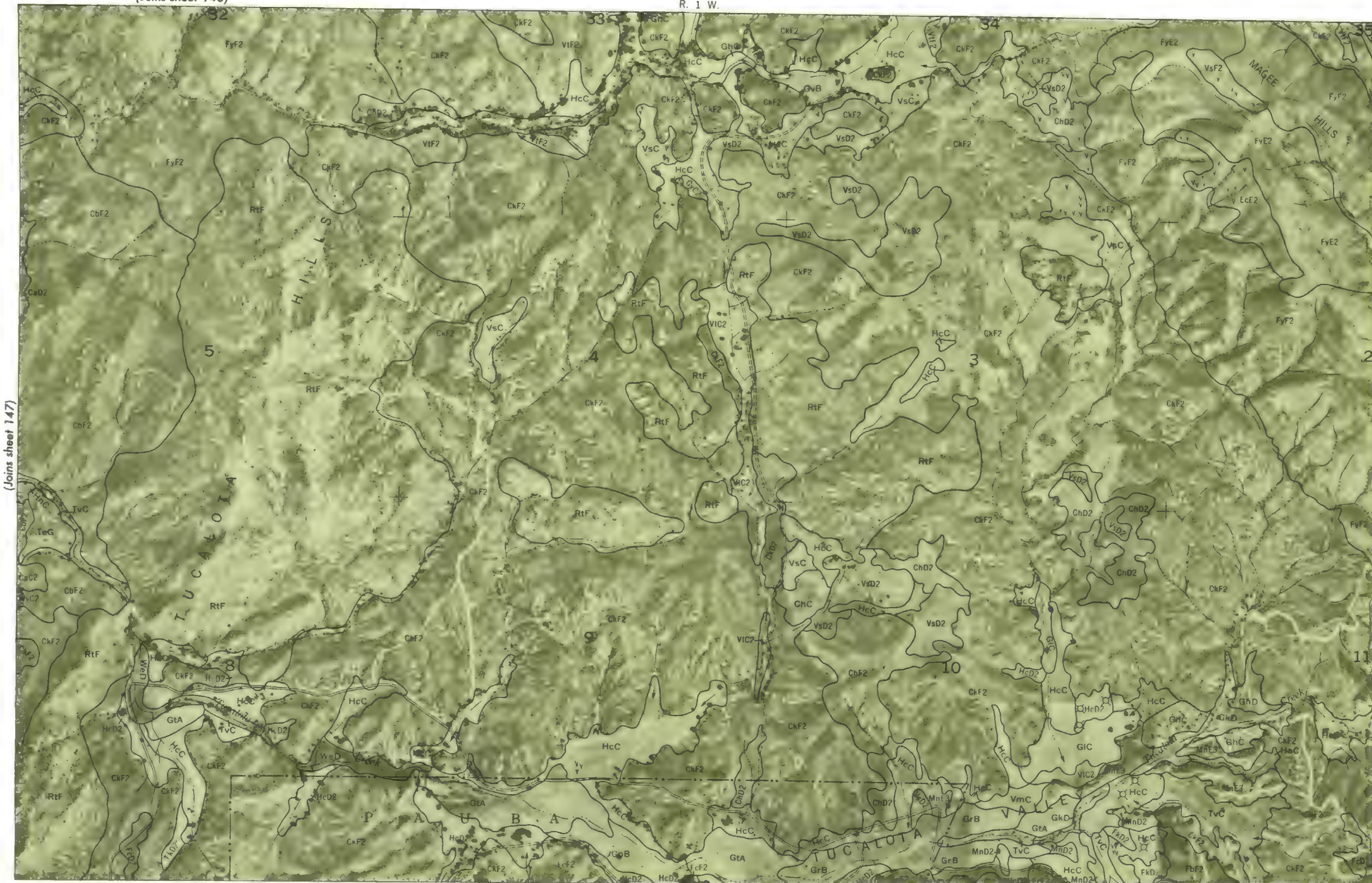
N

(Joins sheet 140)

R. 1 W.

(Joins sheet 147)

(Joins sheet 149)



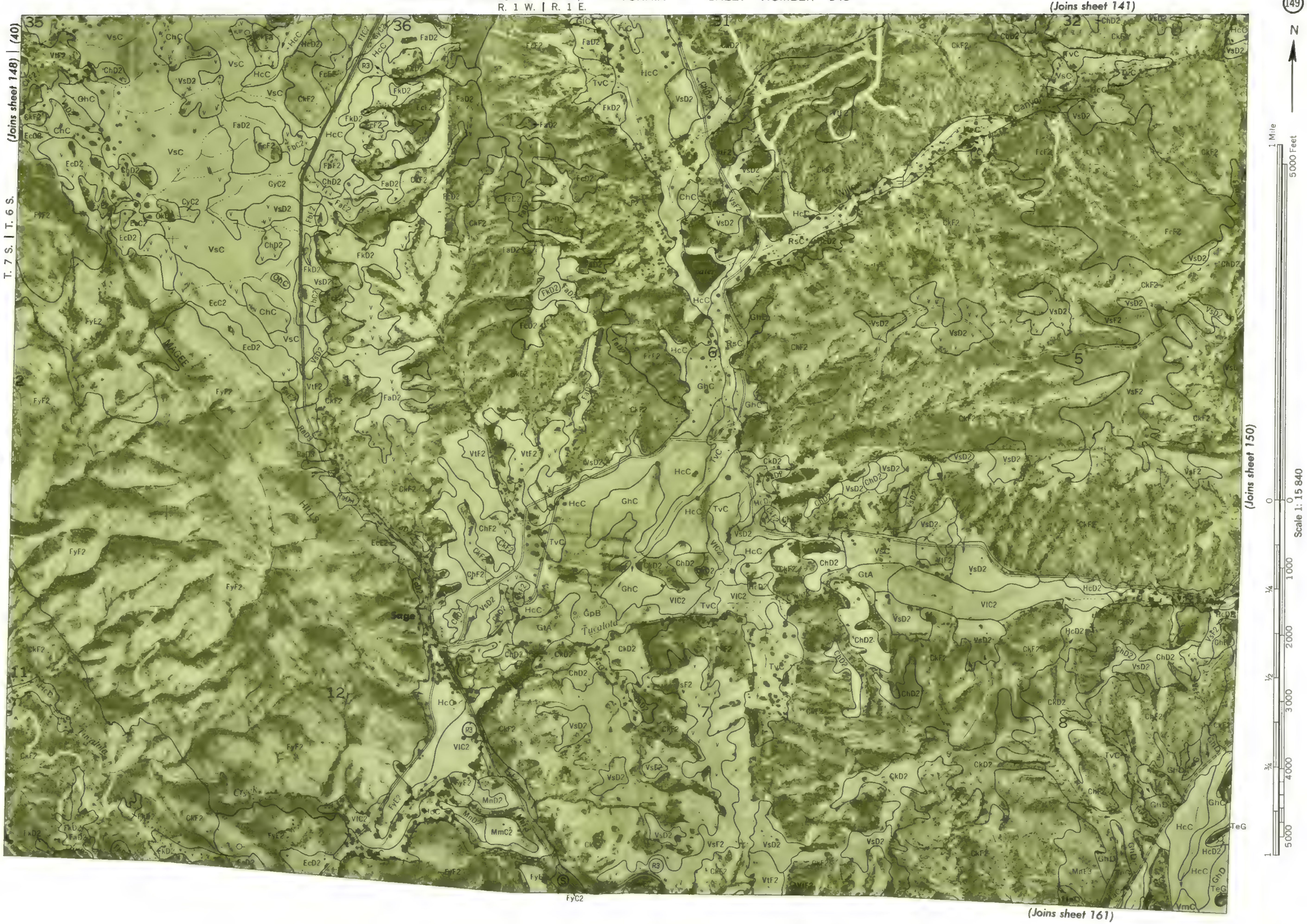
(Joins sheet 160)

1 Mile
5000 Feet
Scale 1: 15 840
0
1000
2000
3000
4000
5000
¼
½
¾
1

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 148

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.



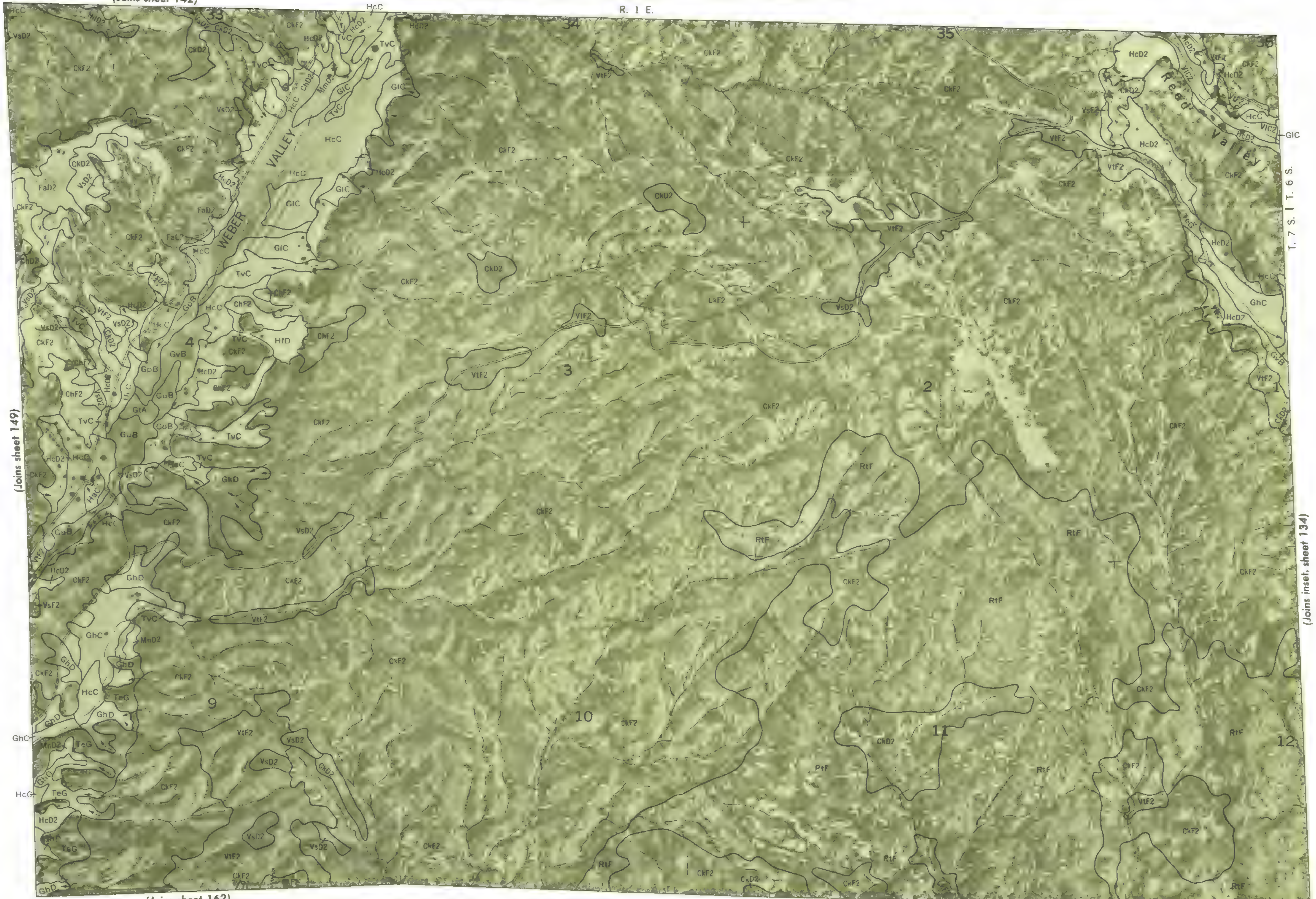
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 149

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 150

R. 1 E.



N

1 Mile

5000 Feet

Scale 1: 15 840

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

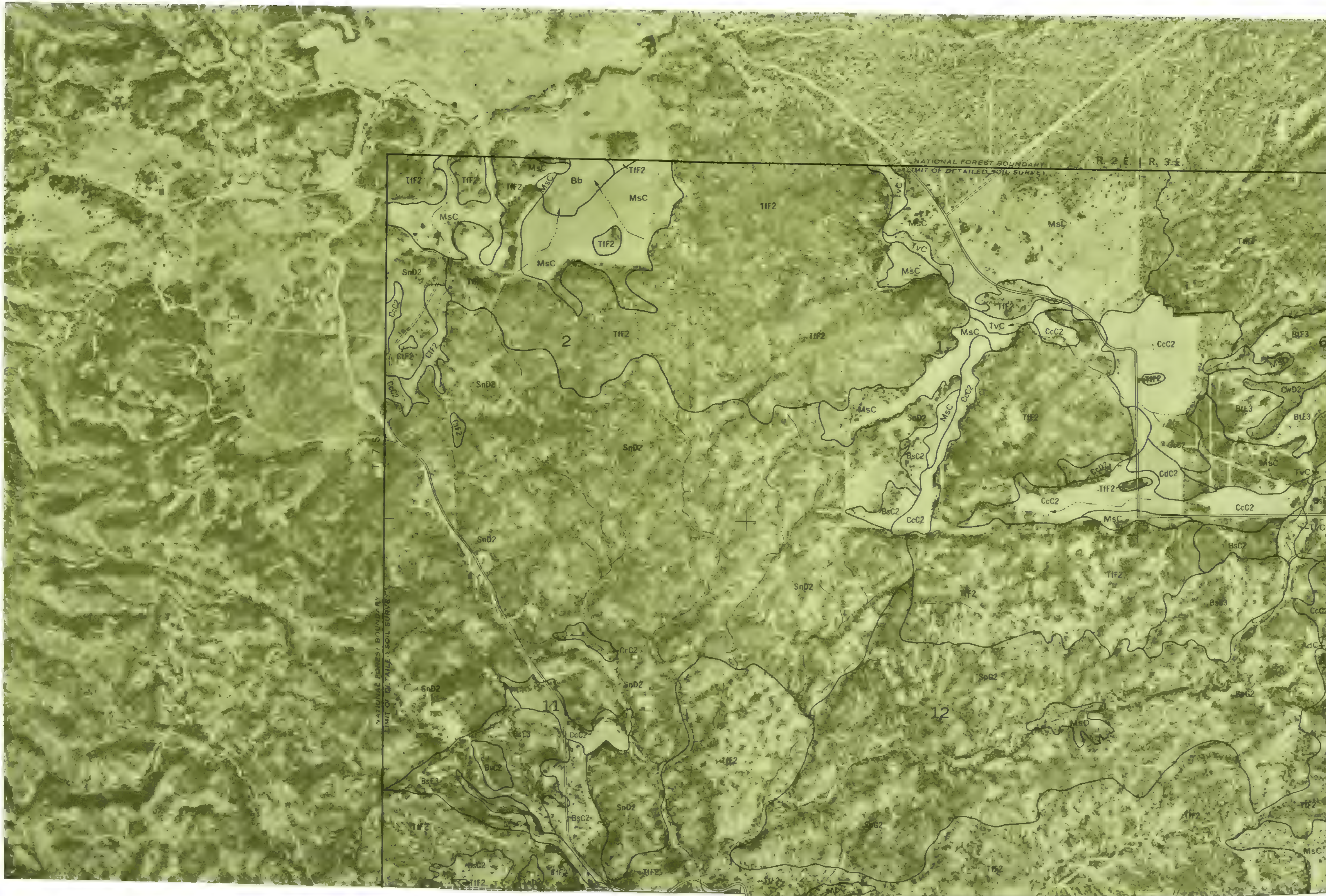
WESTERN RIVERSIDE AREA, CALIFORNIA NO. 150

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

151

N



1 Mile
5000 Feet
Scale 1: 15 840

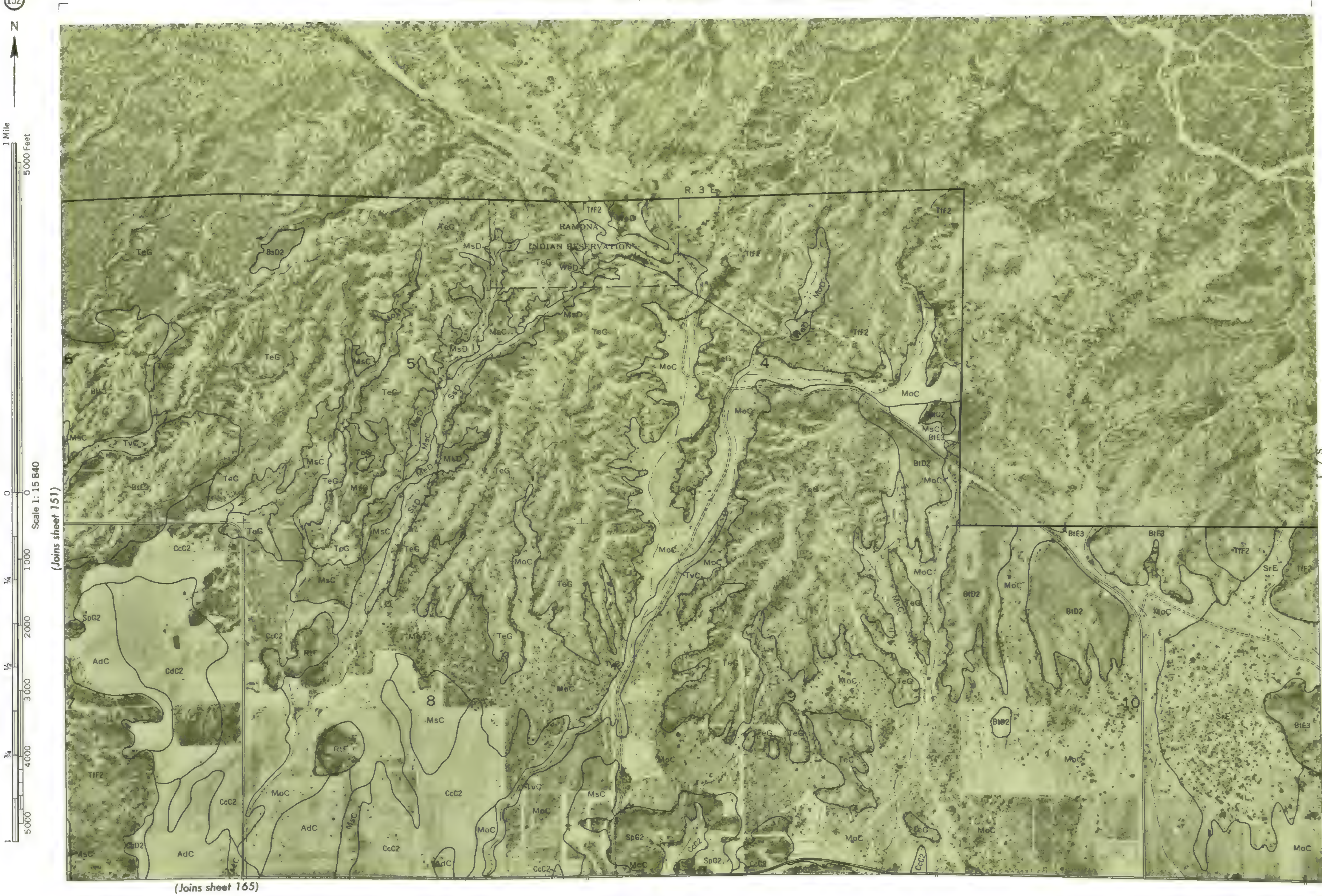
(Joins sheet 152)

(Joins sheet 164)

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 151



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 152

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

153

N

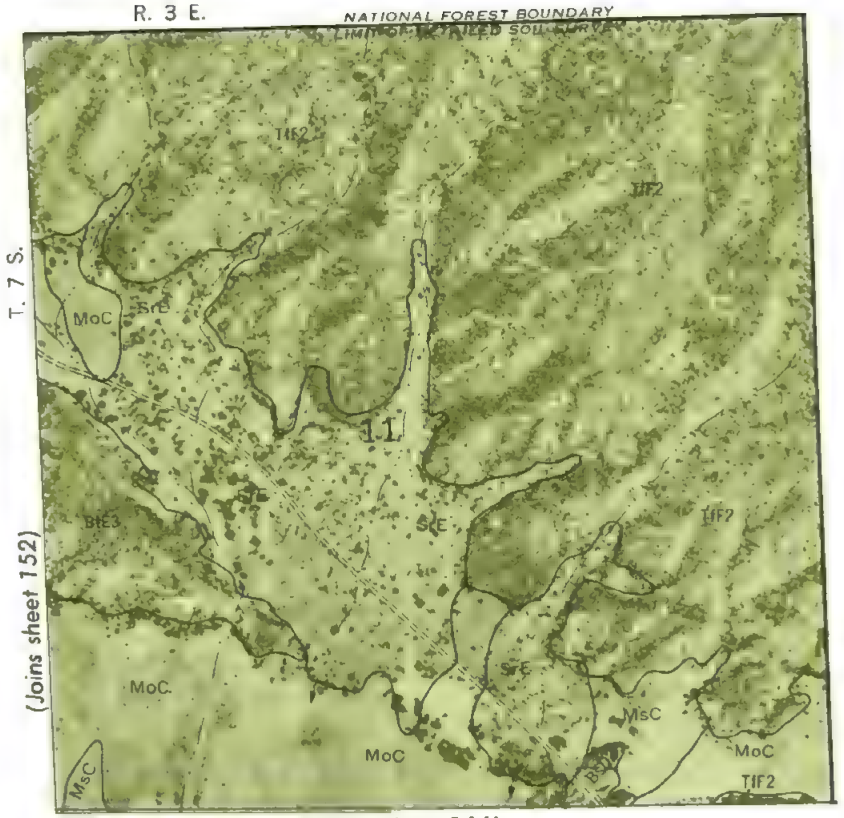
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 153

R. 3 E.

T. 7 S.

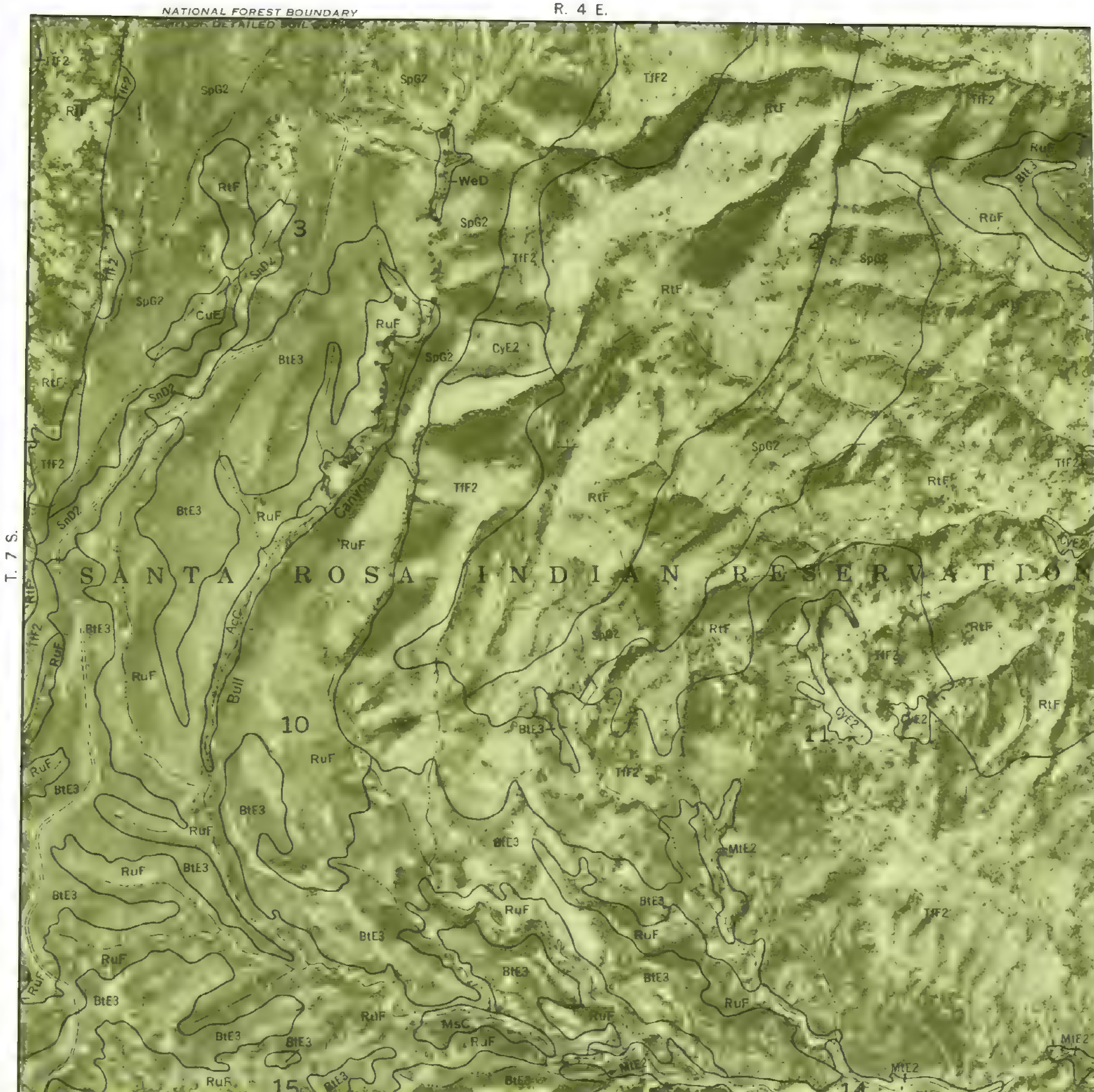


(Joins sheet 152)

(Joins sheet 166)

R. 4 E.

T. 7 S.



(Joins inset, sheet 168)

(Joins sheet 167)

1 Mile

5000 Feet

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

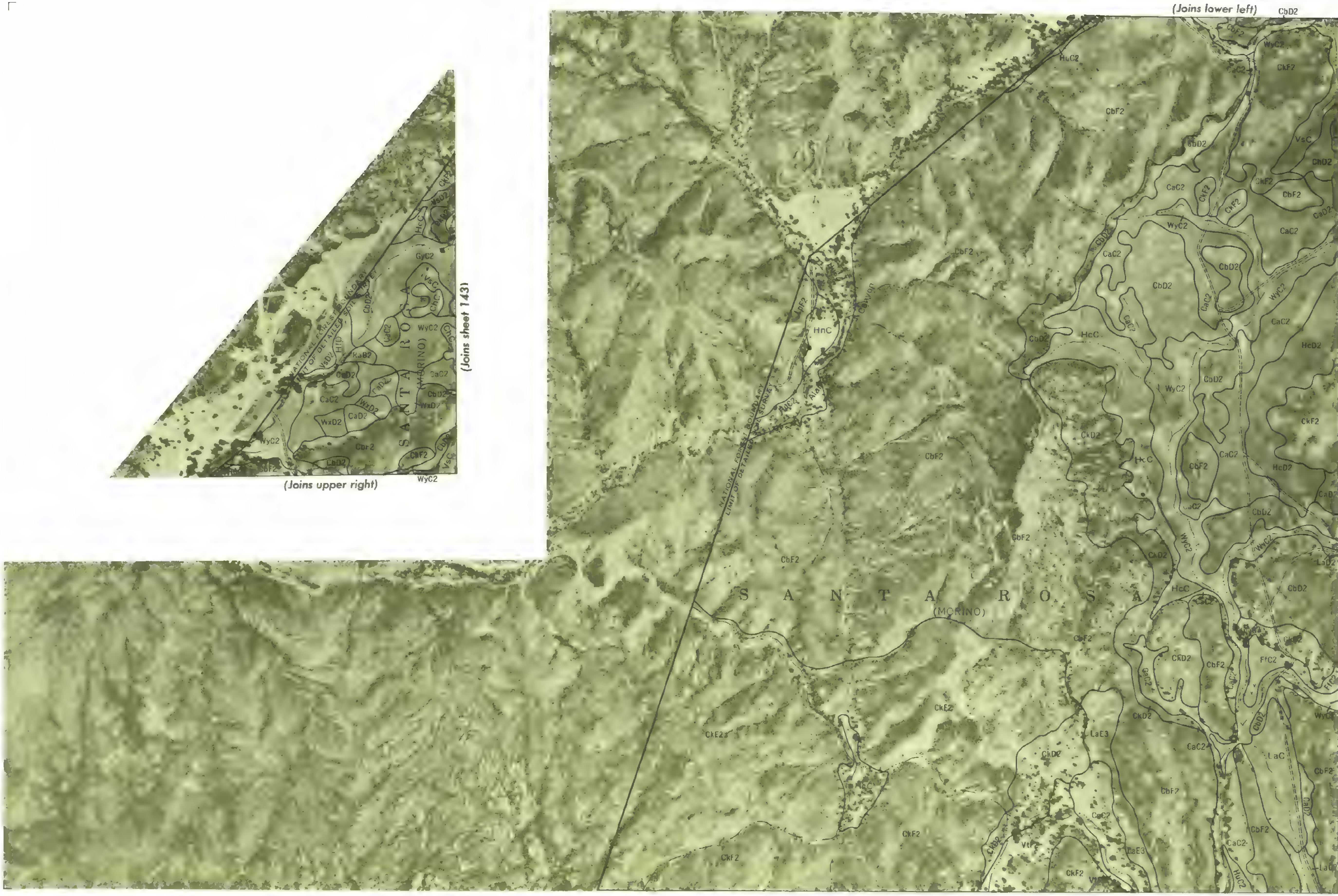
Scale 1: 15 840

154

N

1 Mile
5000 Feet

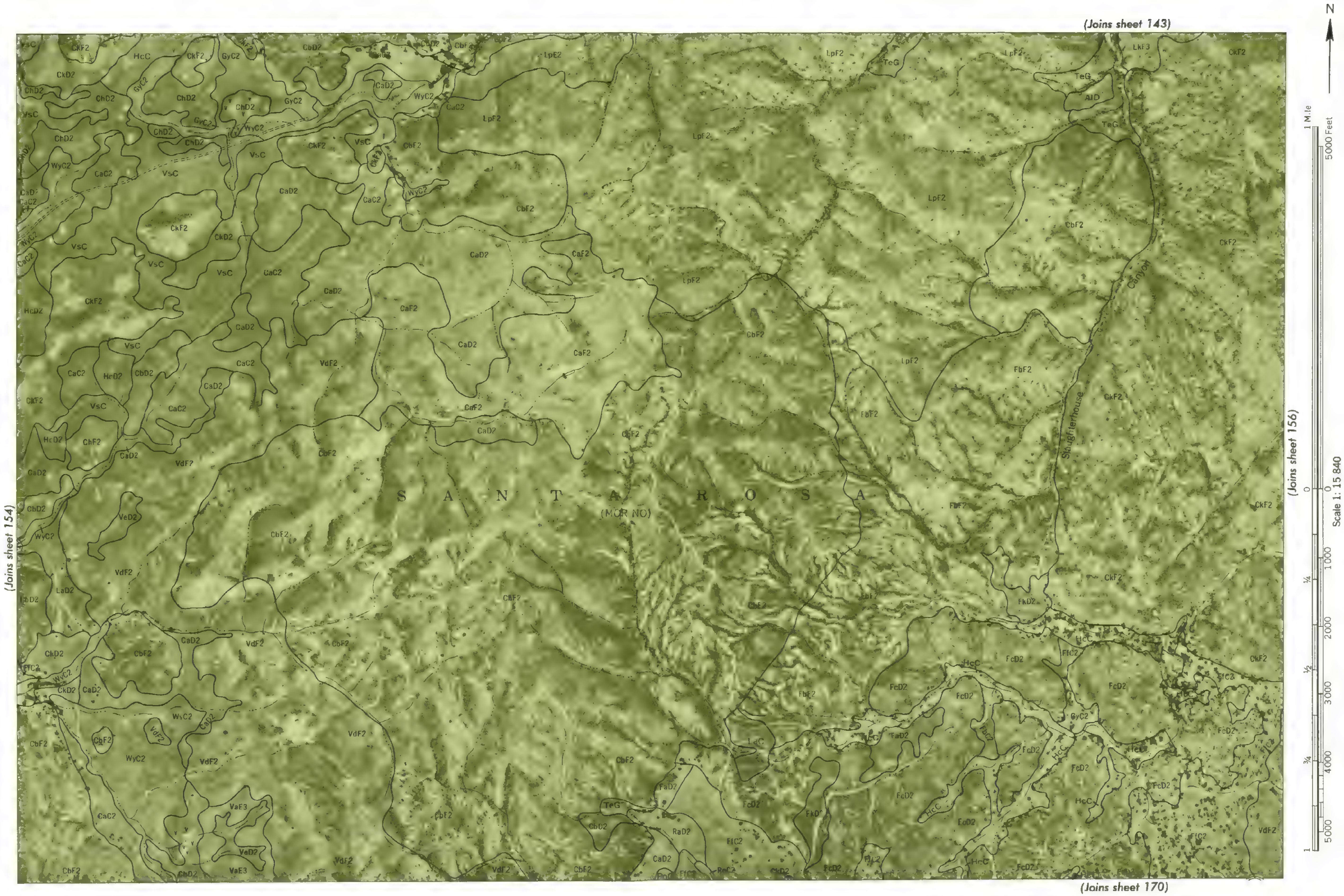
Scale 1: 15 840



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 154

Land division corners are approximately positioned on this map.

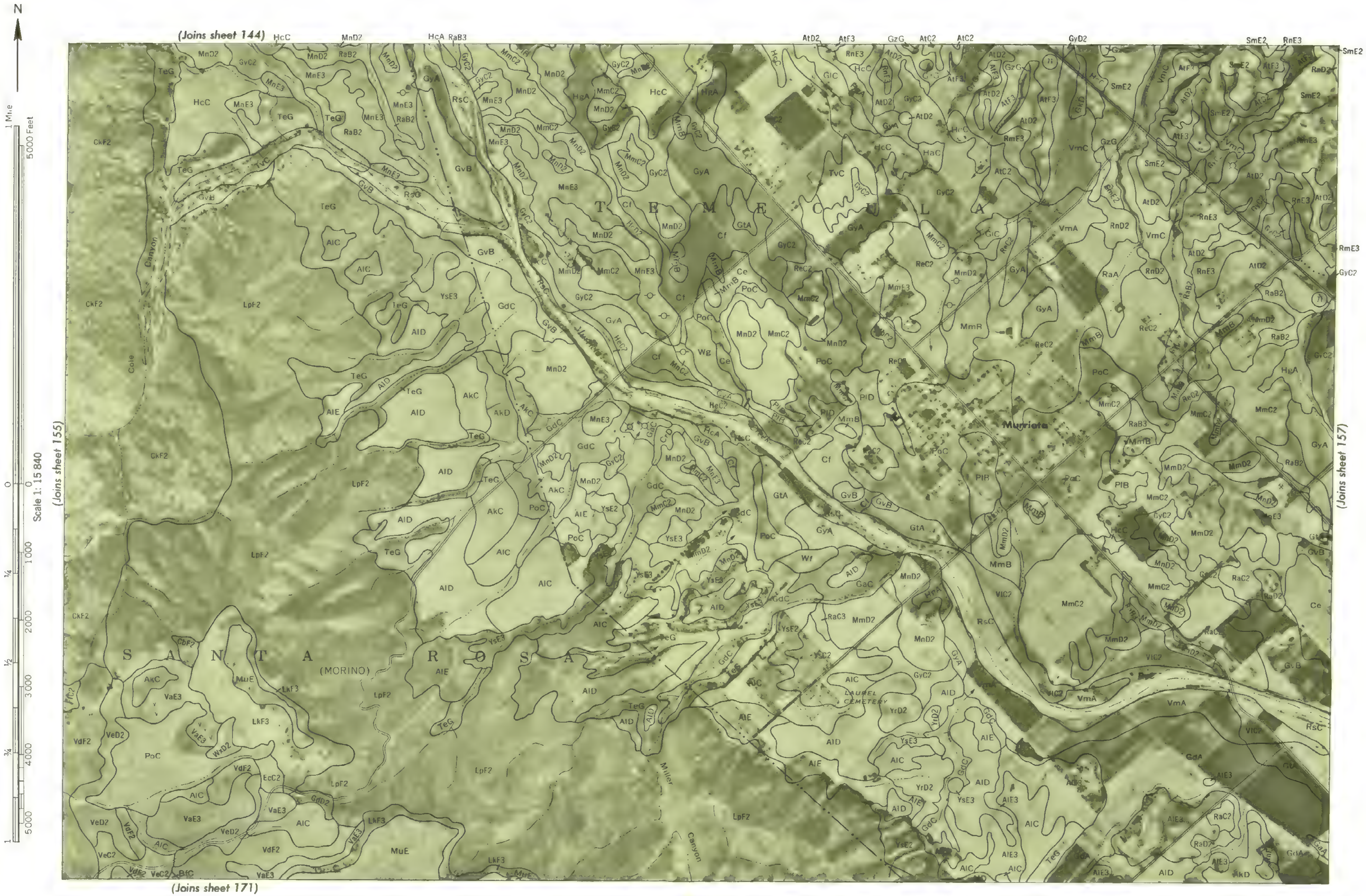
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.



This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 155



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 156

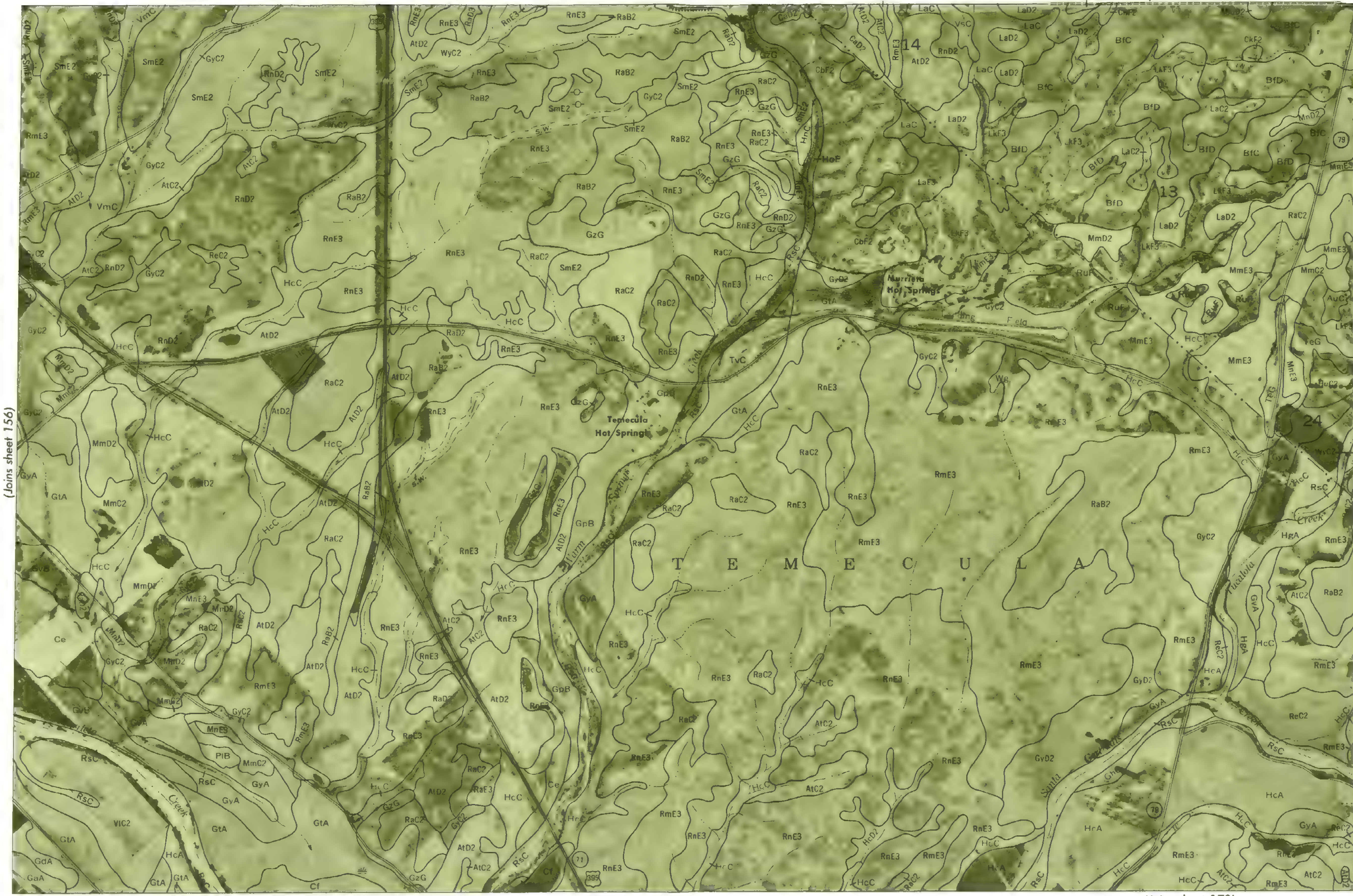
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

157

R. 3 W.

(Joins sheet 145)



(Joins sheet 156)

(Joins sheet 158)

(Joins sheet 172)

N

Scale 1: 15 840

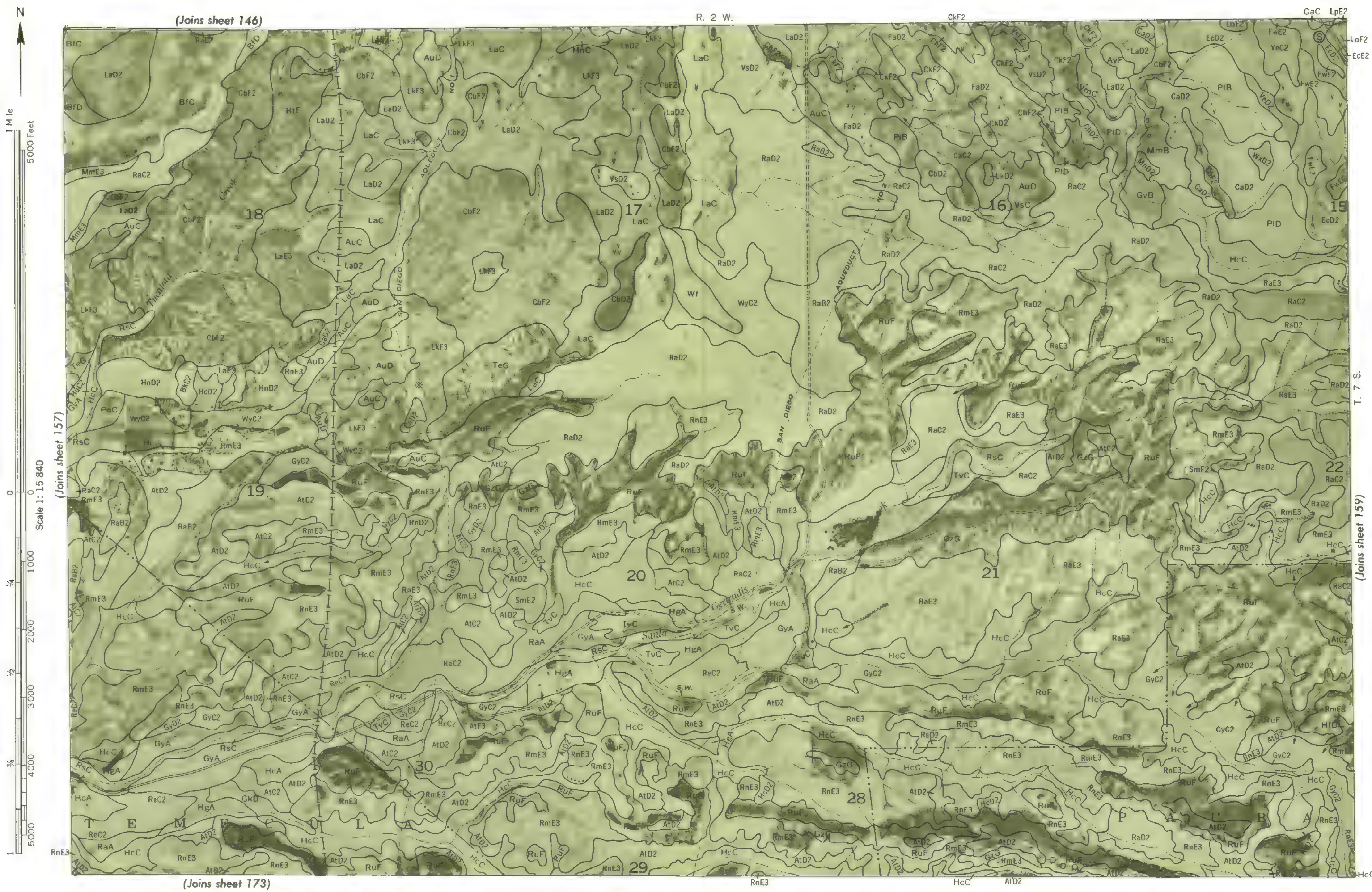
1 Mile

5000 Feet

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 157

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 158

Land divisions on corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1959 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

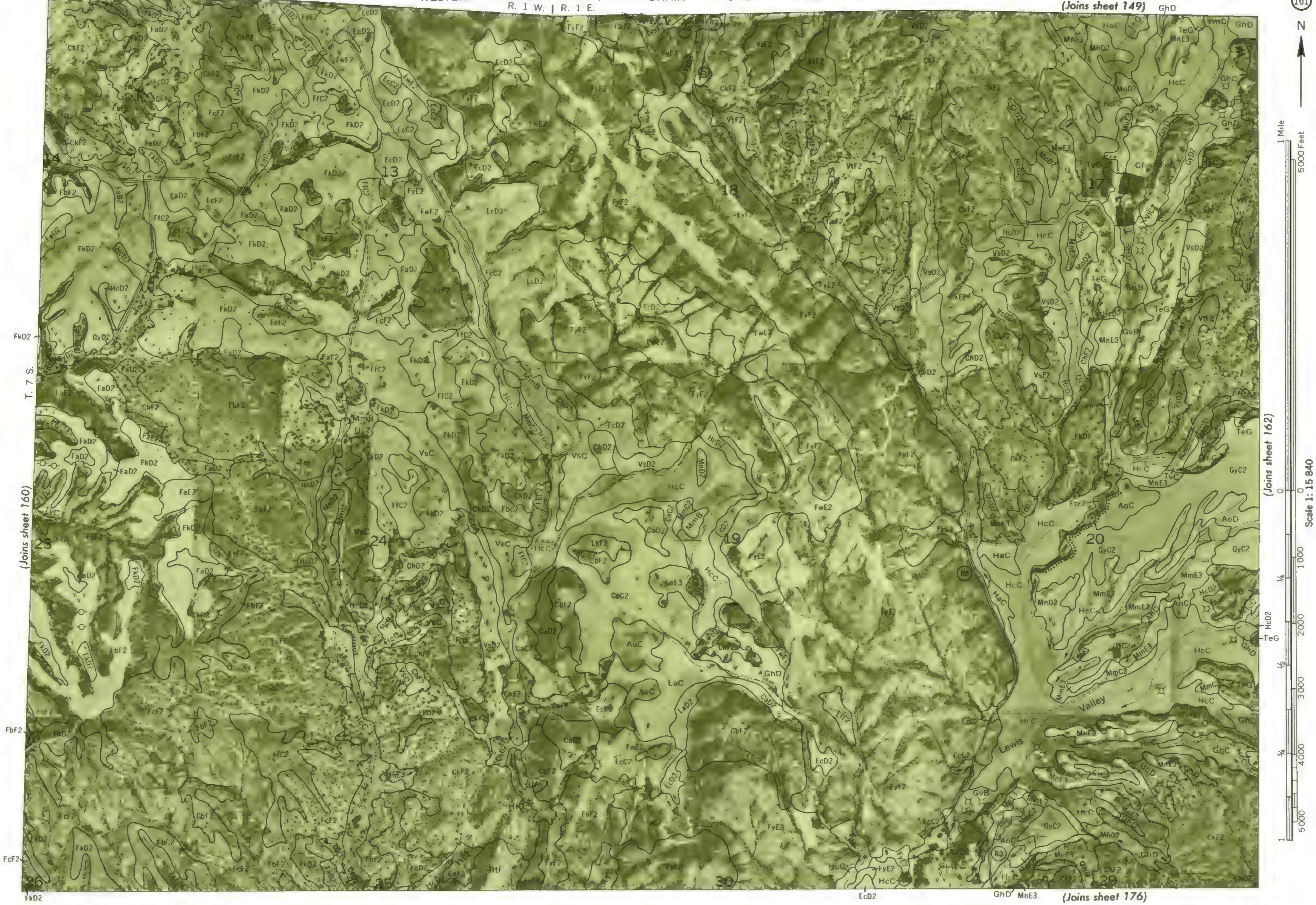
WESTERN RIVERSIDE AREA, CALIFORNIA NO. 159

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 160

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

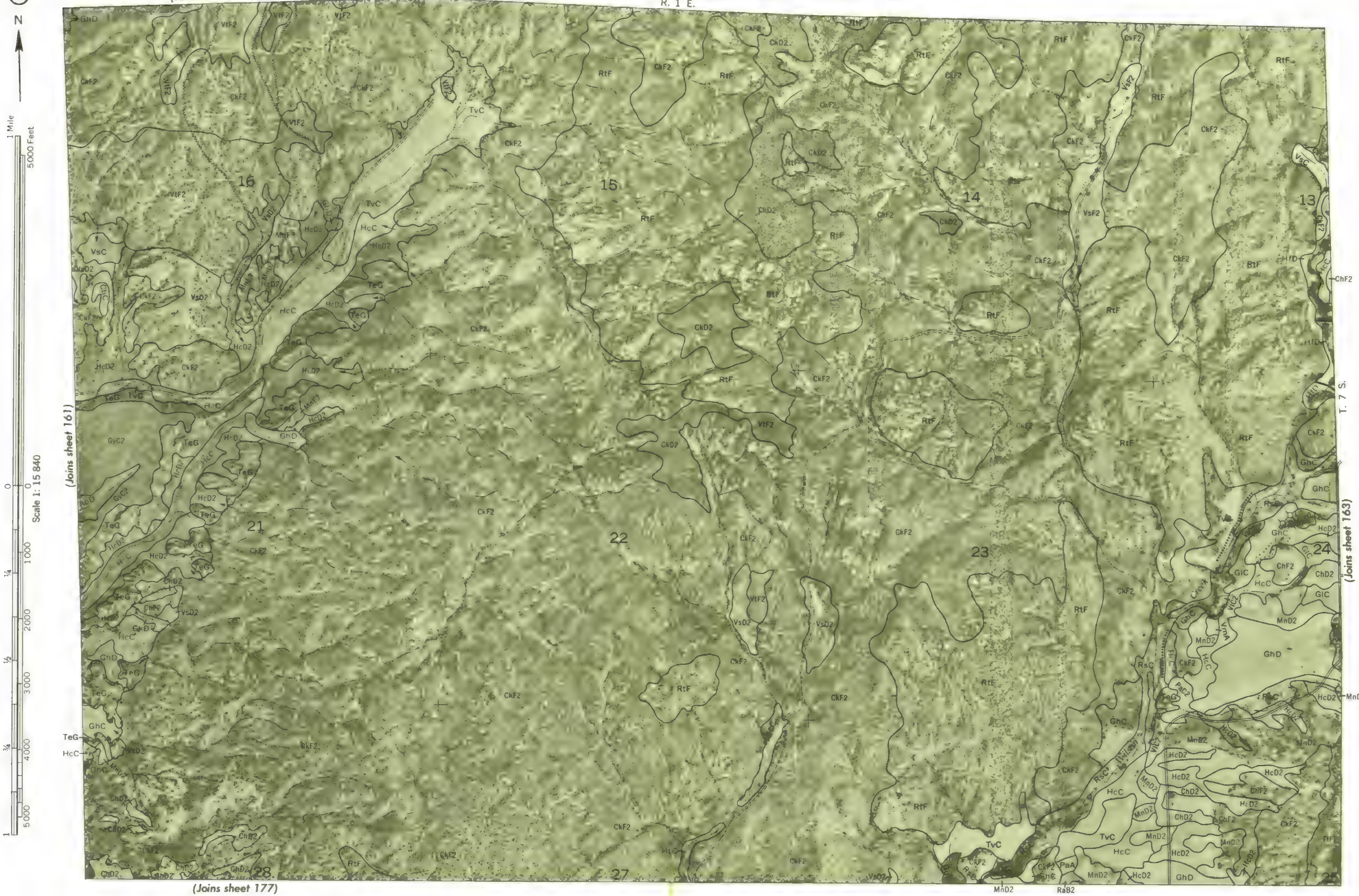
WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 161



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 161

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 162

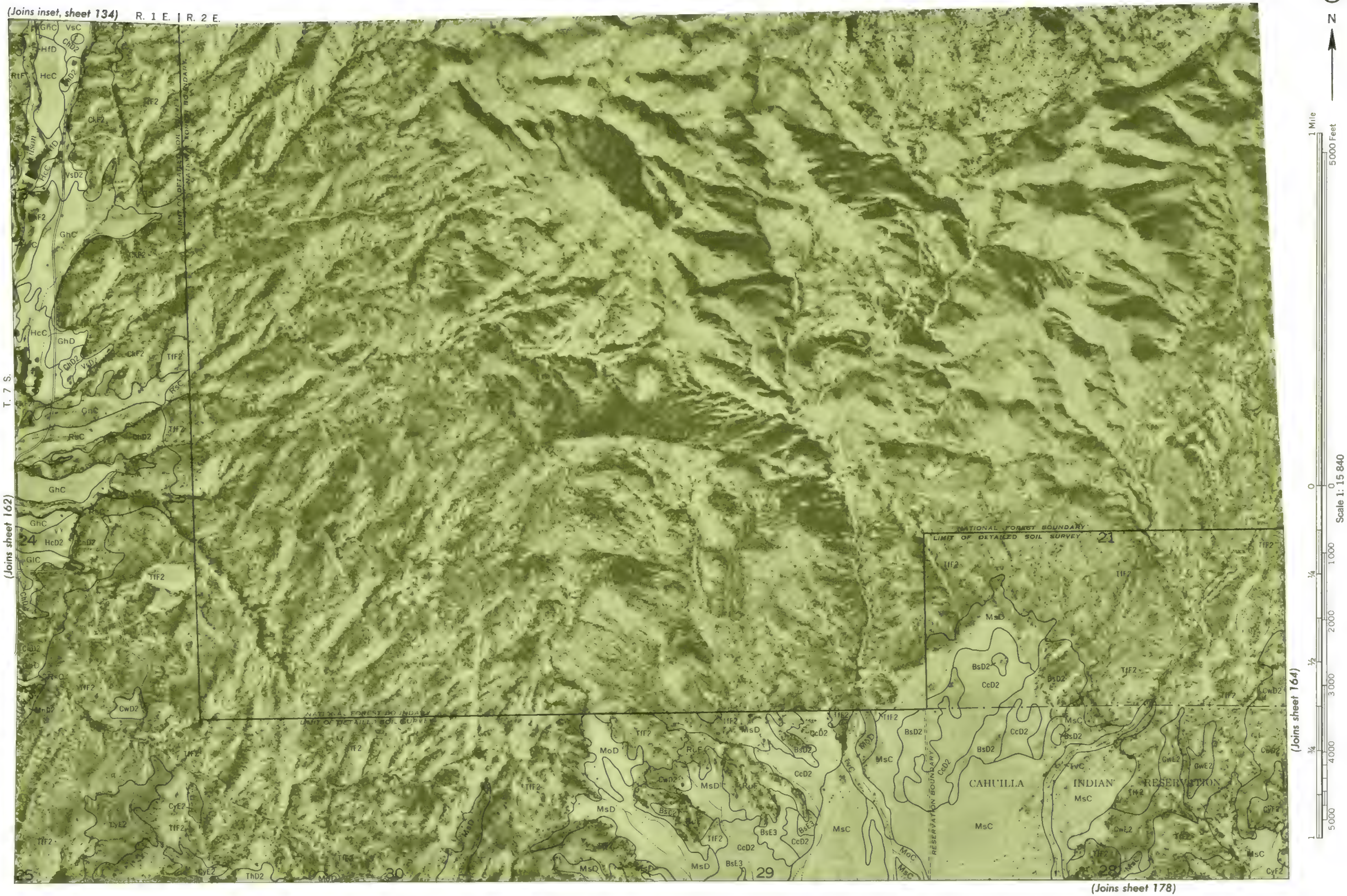
Land division corners are approximately positioned on this map.

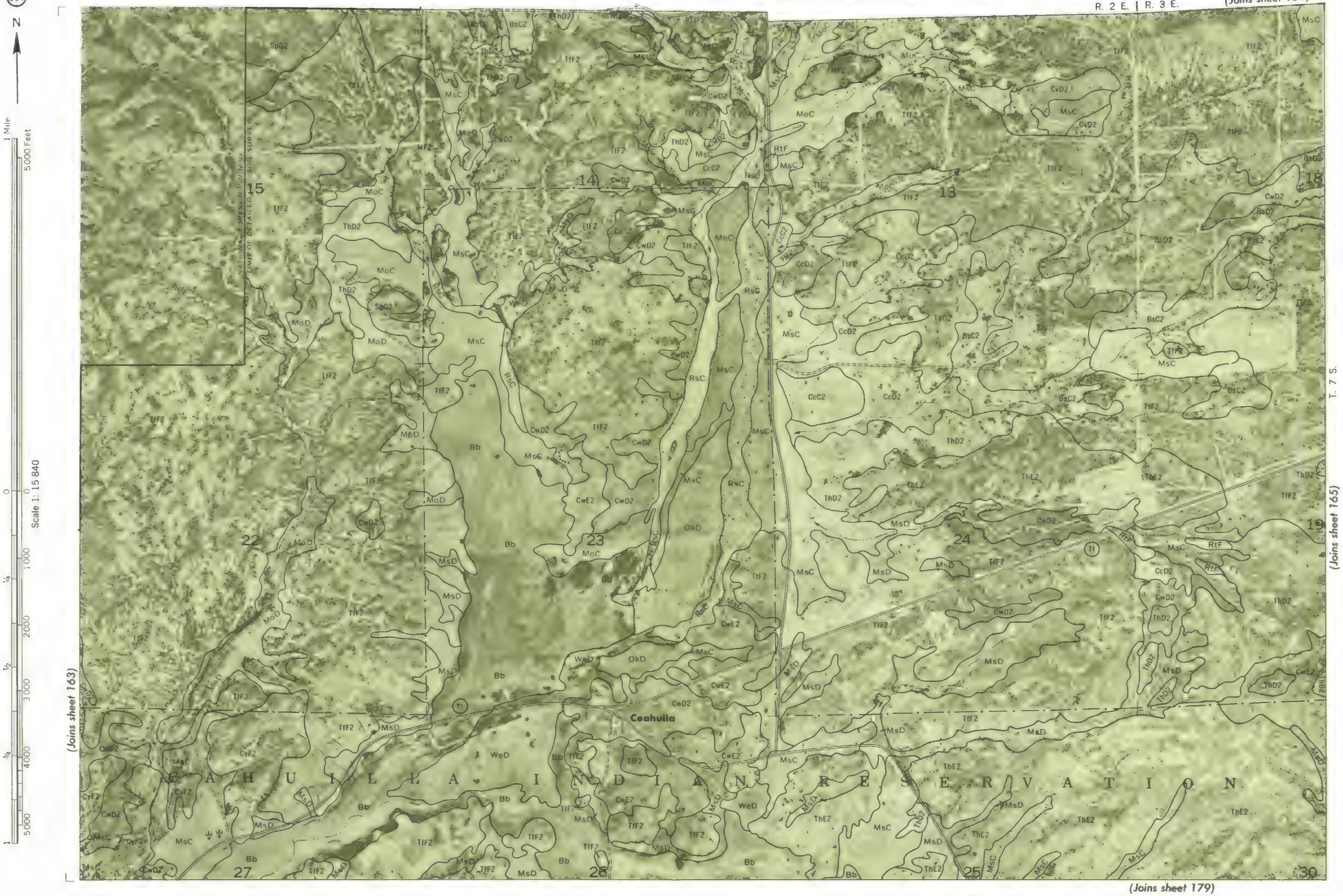
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

Land division corners are approximately positioned on this map

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 163





WESTERN RIVERSIDE AREA, CALIFORNIA NO. 164

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 165

(Joins inset, sheet 153)

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 166

N

1 Mile

5000 Feet

Scale 1: 15 840

0 — 1/4 — 1/2 — 3/4 — 1

0 — 1000 — 2000 — 3000 — 4000 — 5000

(Joins sheet 165)

(Joins sheet 181)

(Joins sheet 167)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 166

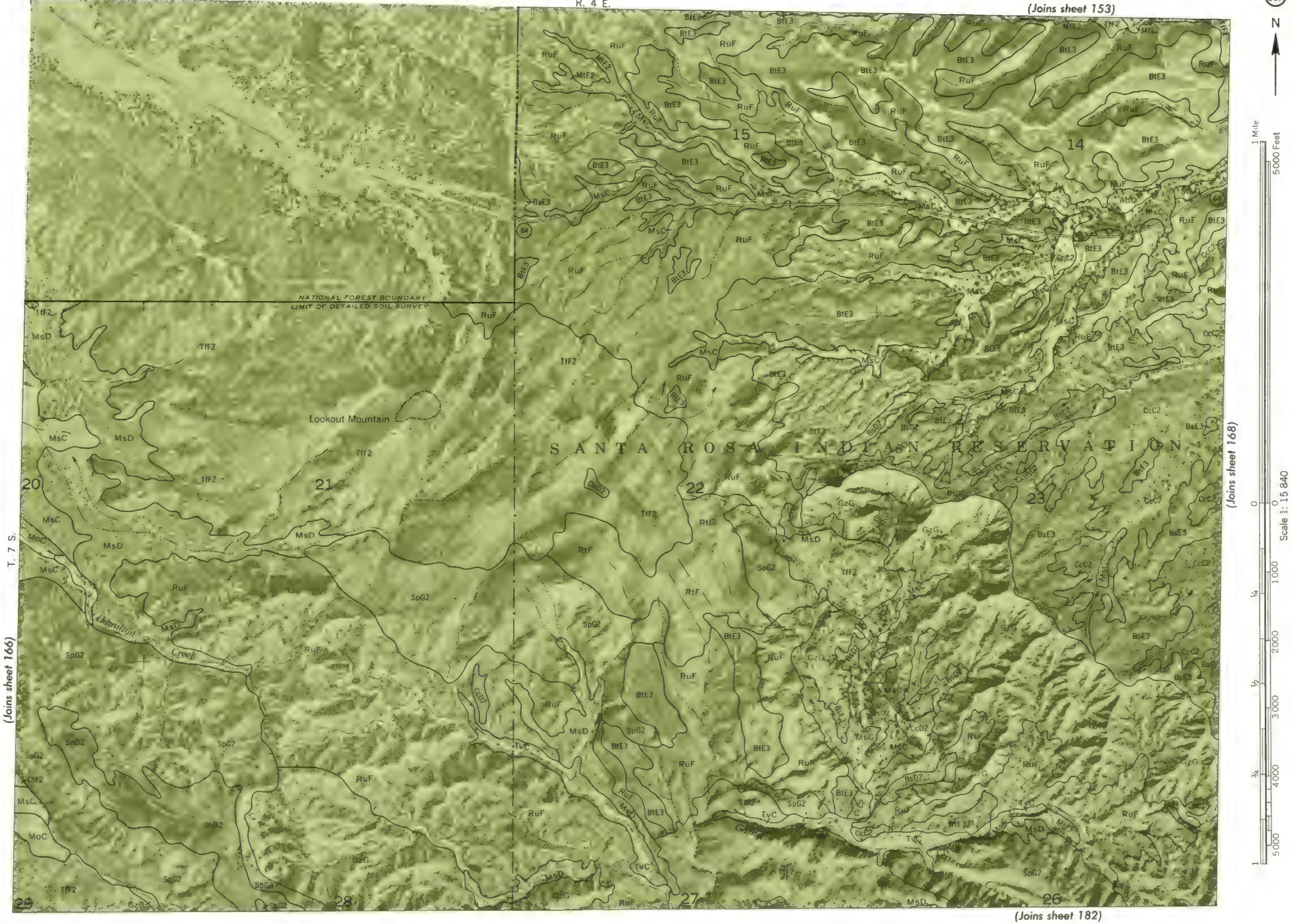
Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 167

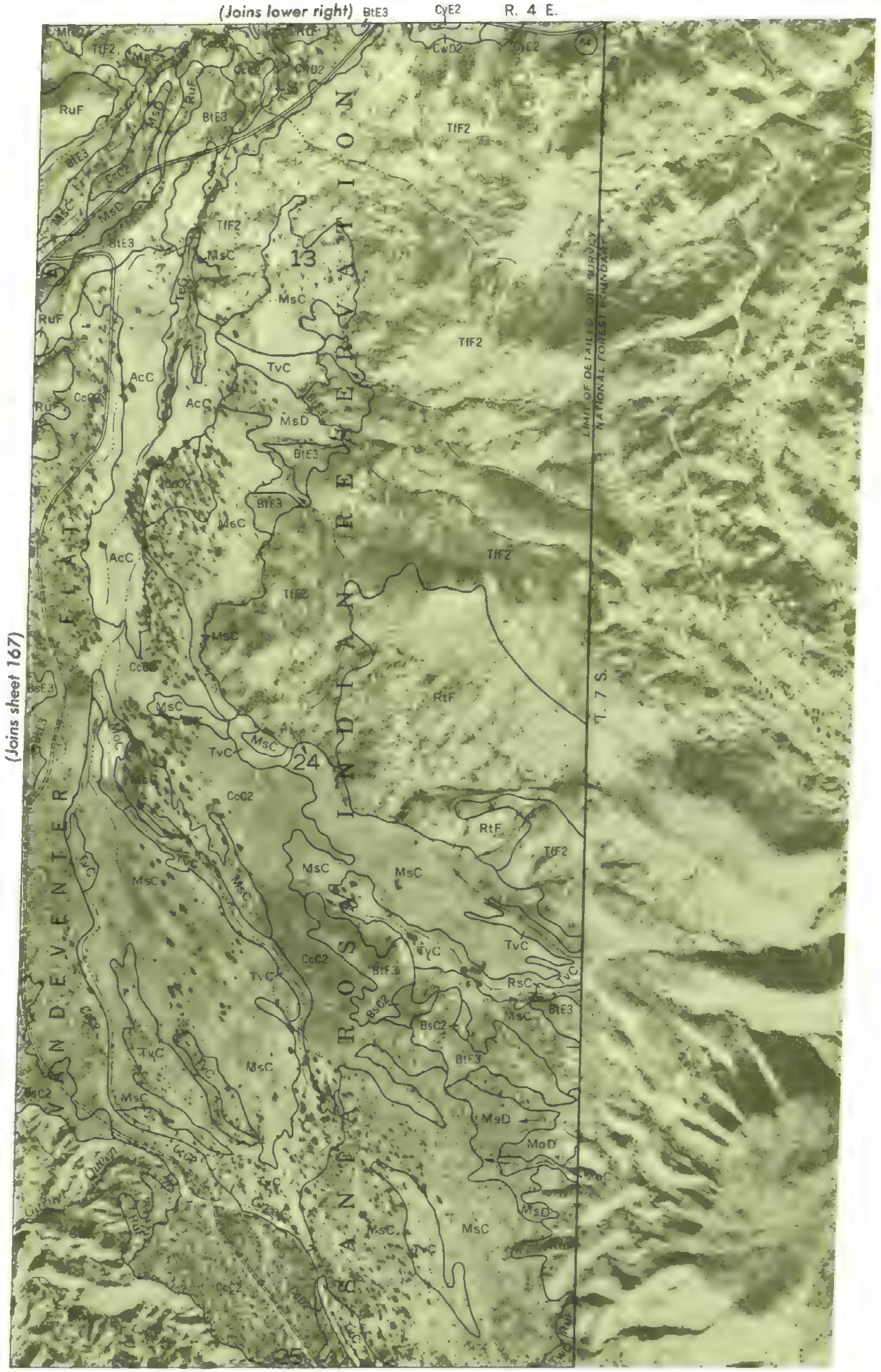


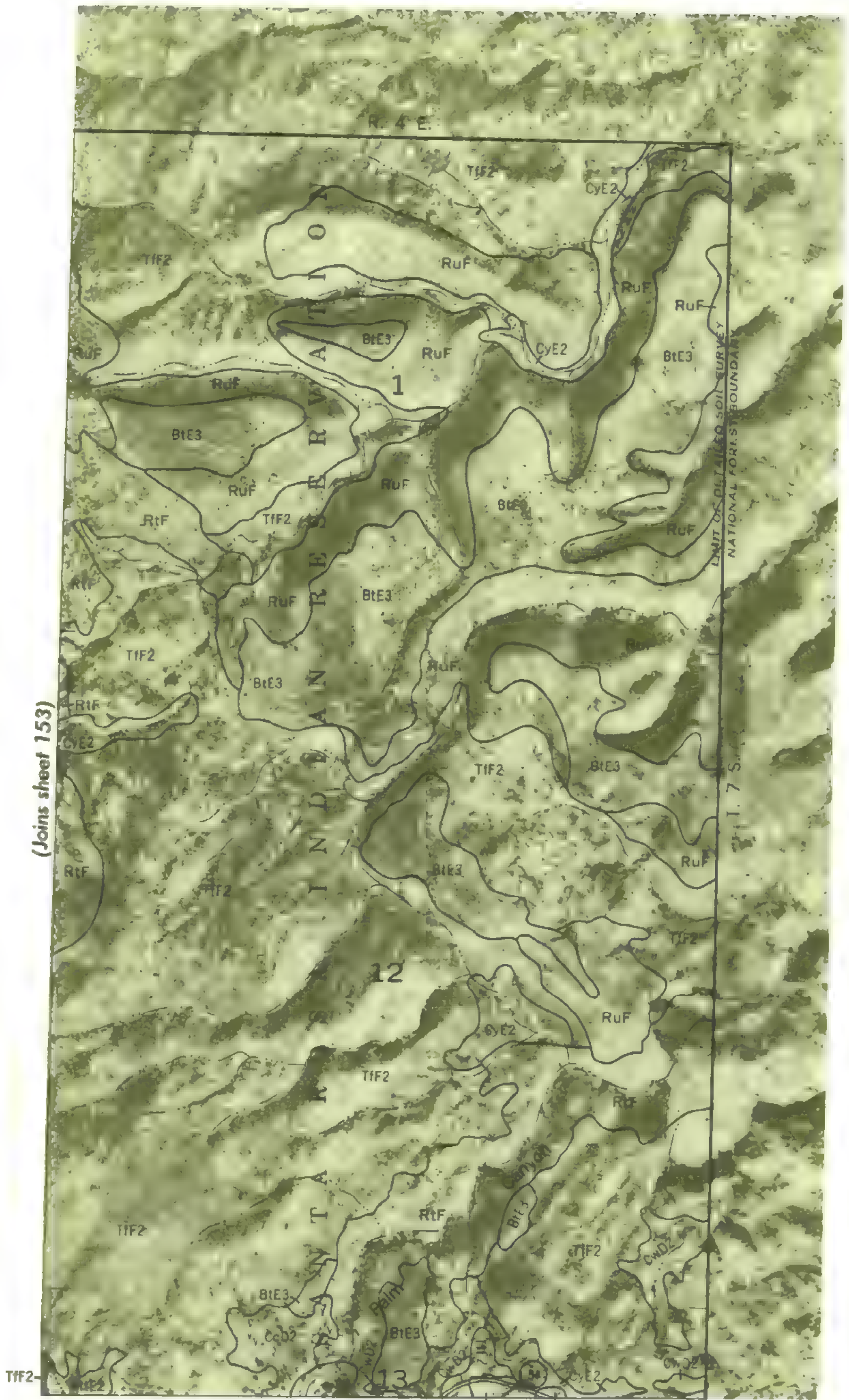
N

1 Mile

5000 Feet

Scale 1: 15 840





WESTERN RIVERSIDE AREA, CALIFORNIA NO. 168

Land division corners are approximately positioned on this map.

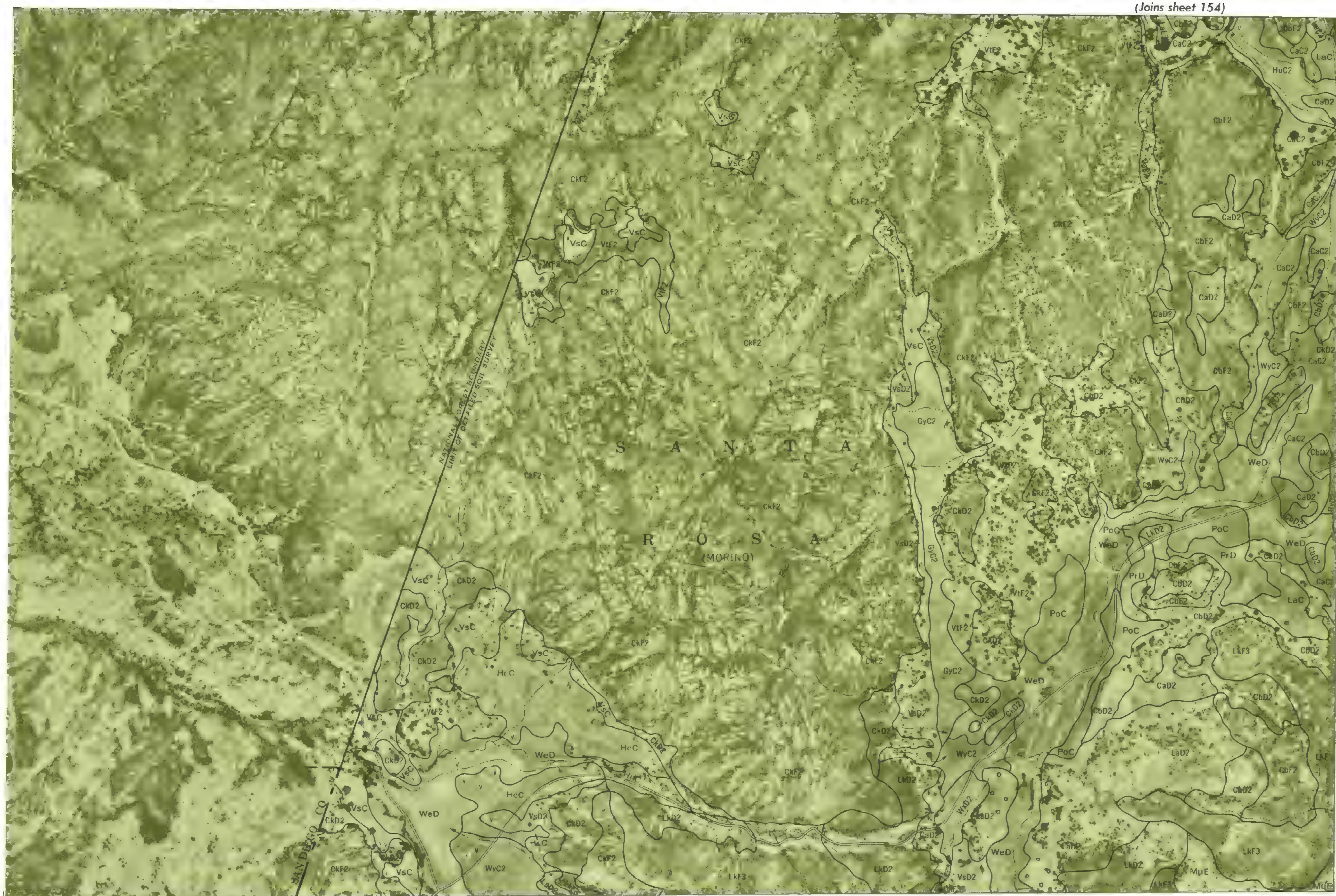
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 169

(Joins sheet 154)



(Joins sheet 170)

(Joins sheet 185)

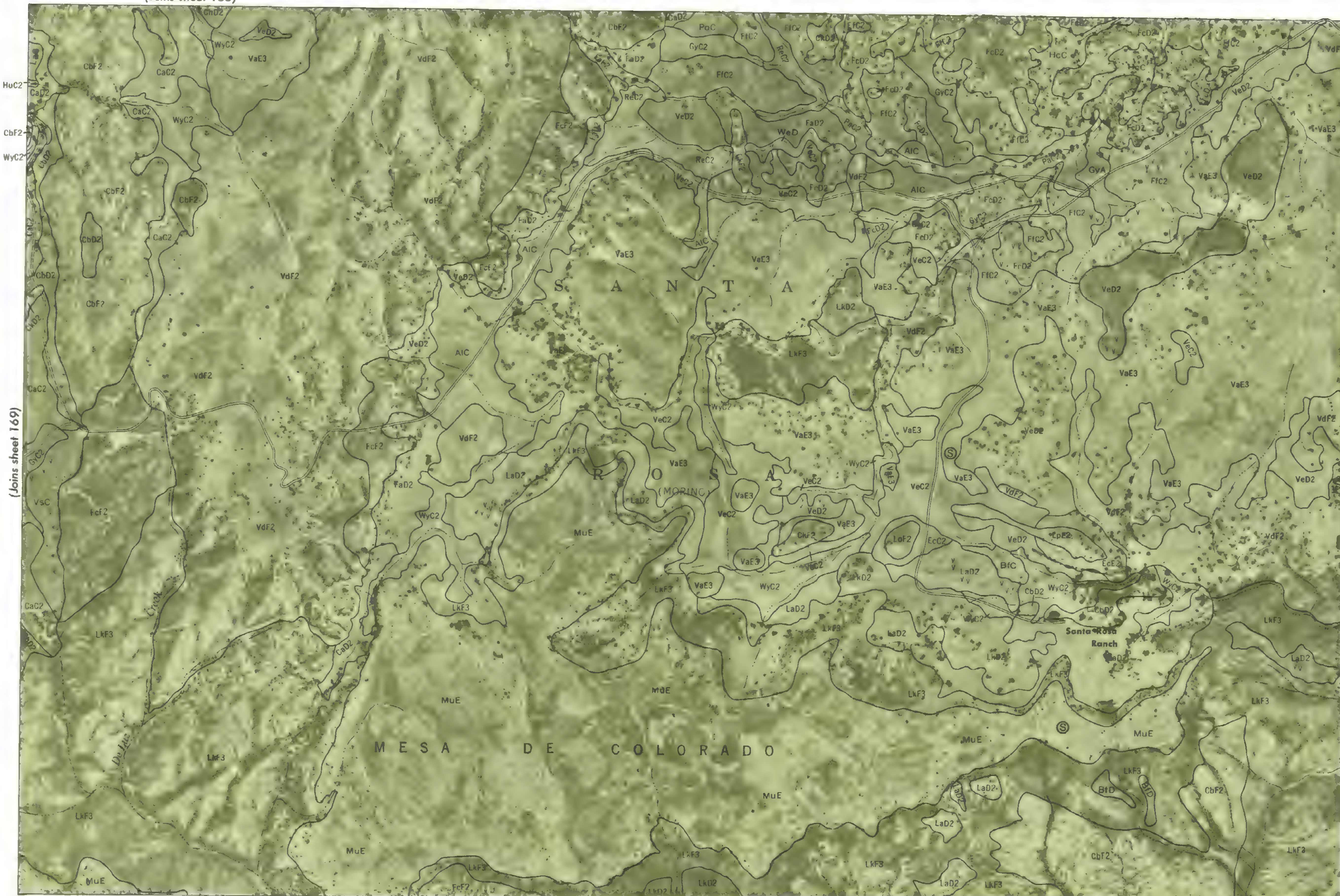
N

1 Mile
5000 Feet
Scale 1: 15 840

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 170

(Joins sheet 155)

(Joins sheet 169)



(Joins sheet 171)

(Joins sheet 186)

N

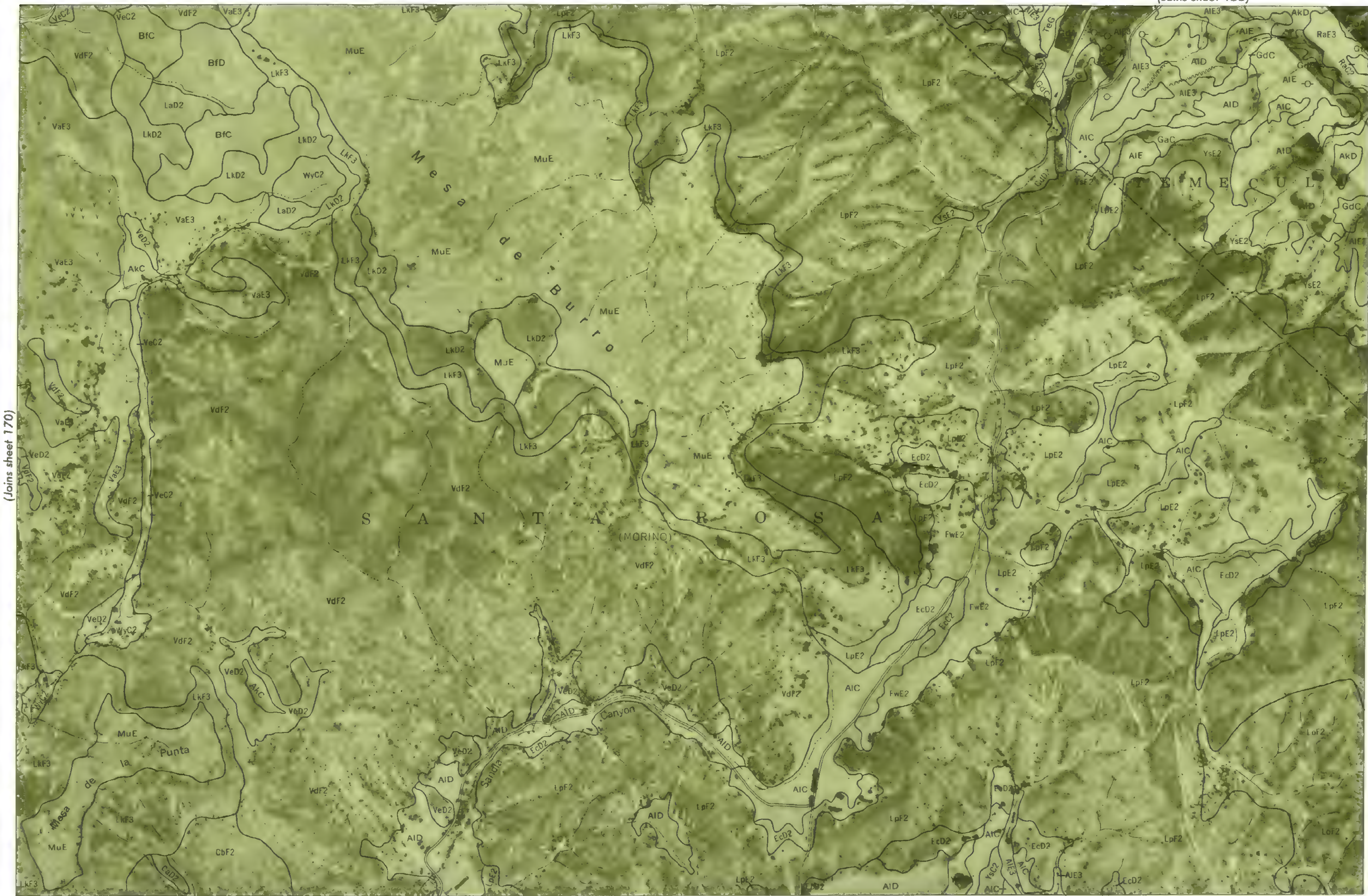
1 Mile — 5000 Feet

Scale 1: 15 840

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 170

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.



N

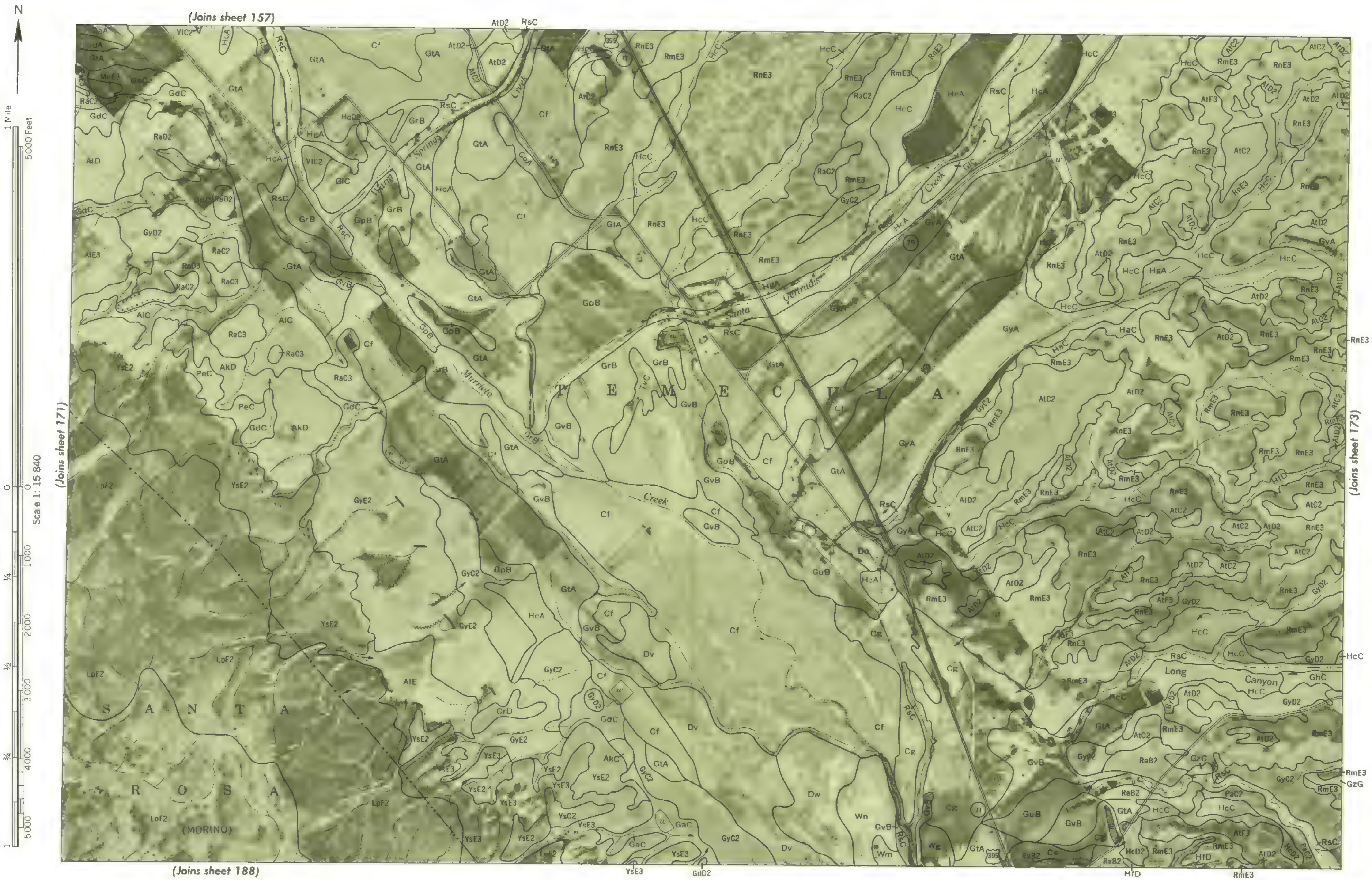
Scale 1: 15 840

1 Mile

5000 Feet

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

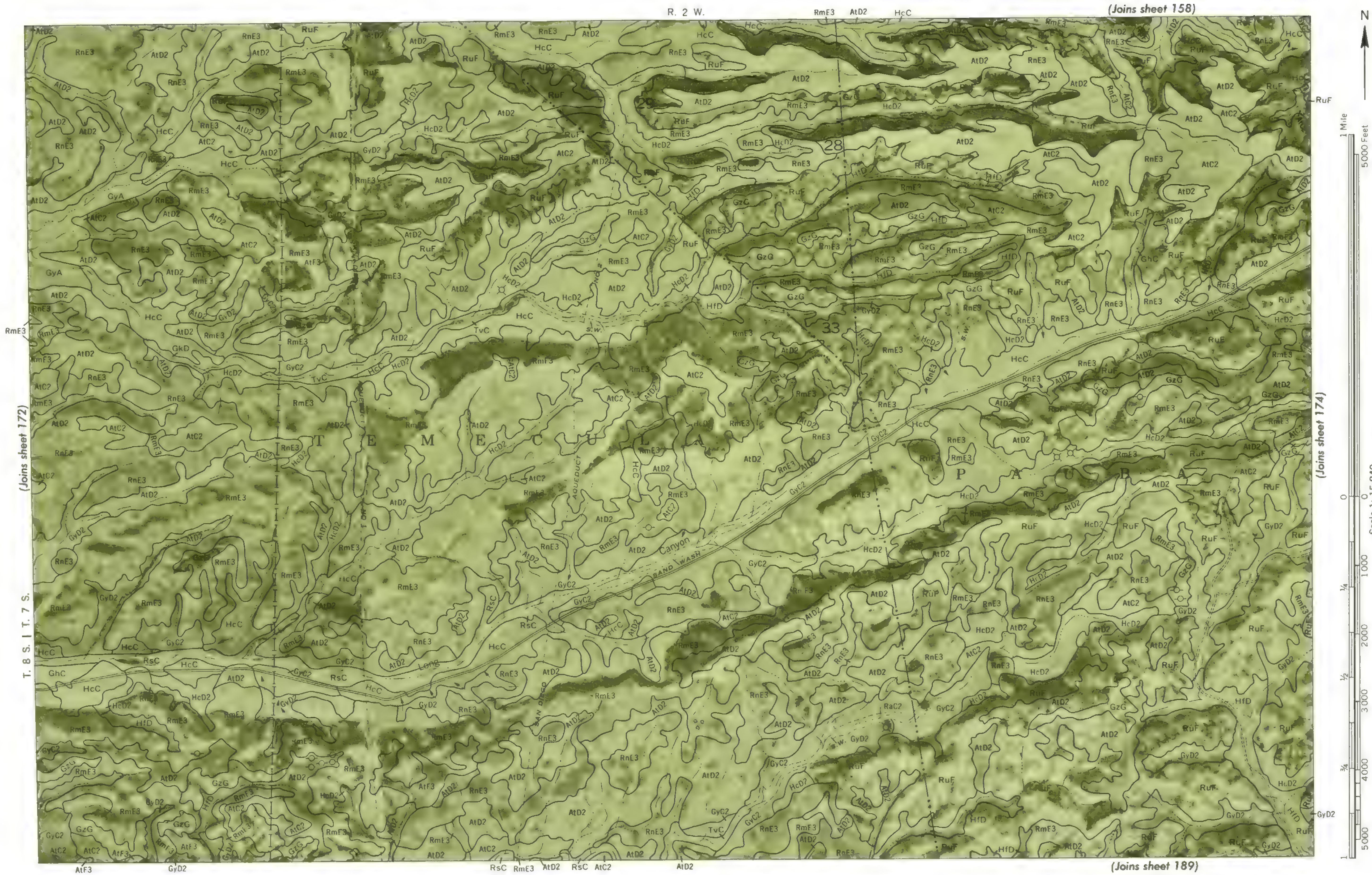
Land division corners are approximately positioned on this map.



Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

173

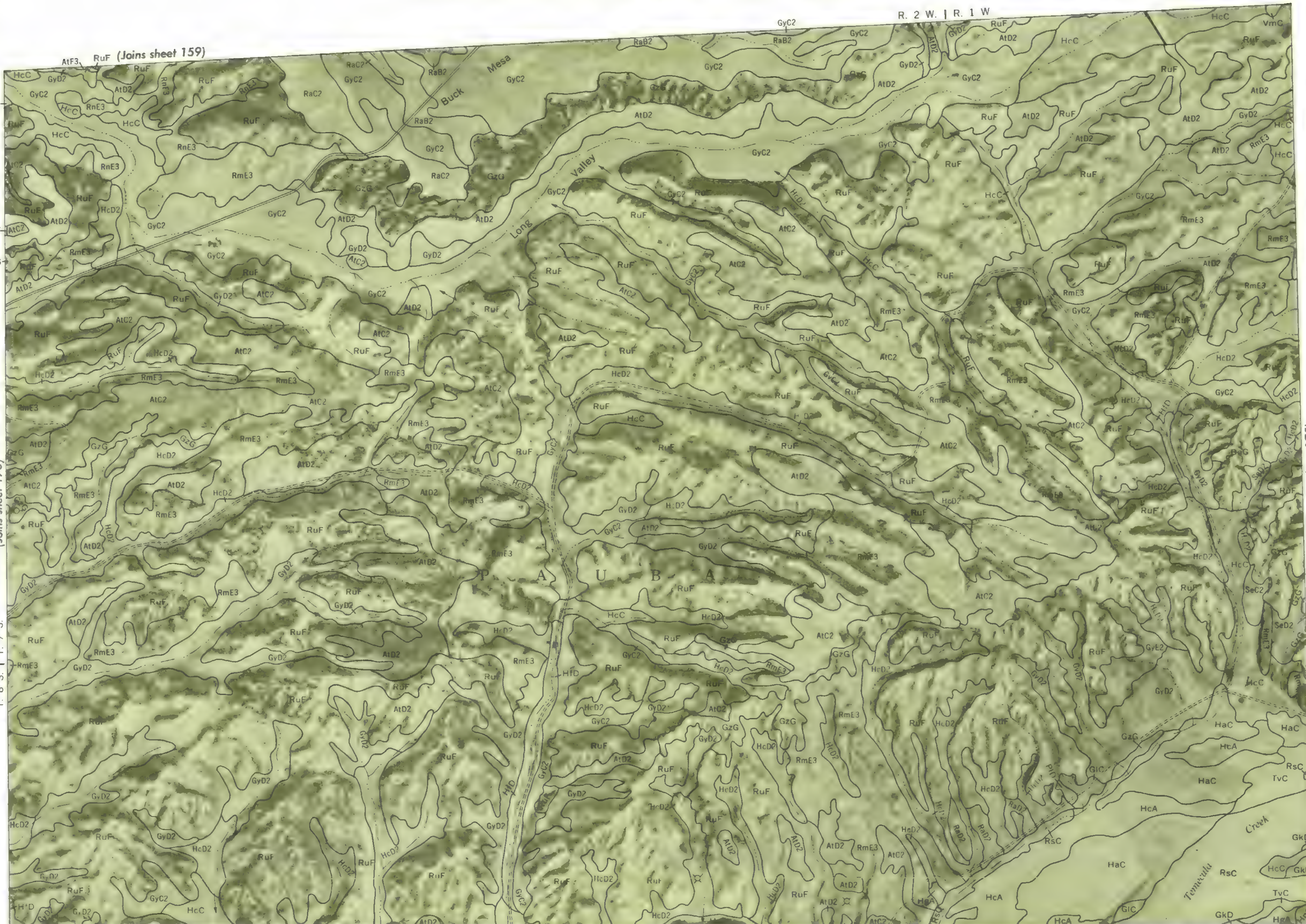


WESTERN RIVERSIDE AREA, CALIFORNIA NO. 173

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 174



N

Scale 1:15 840

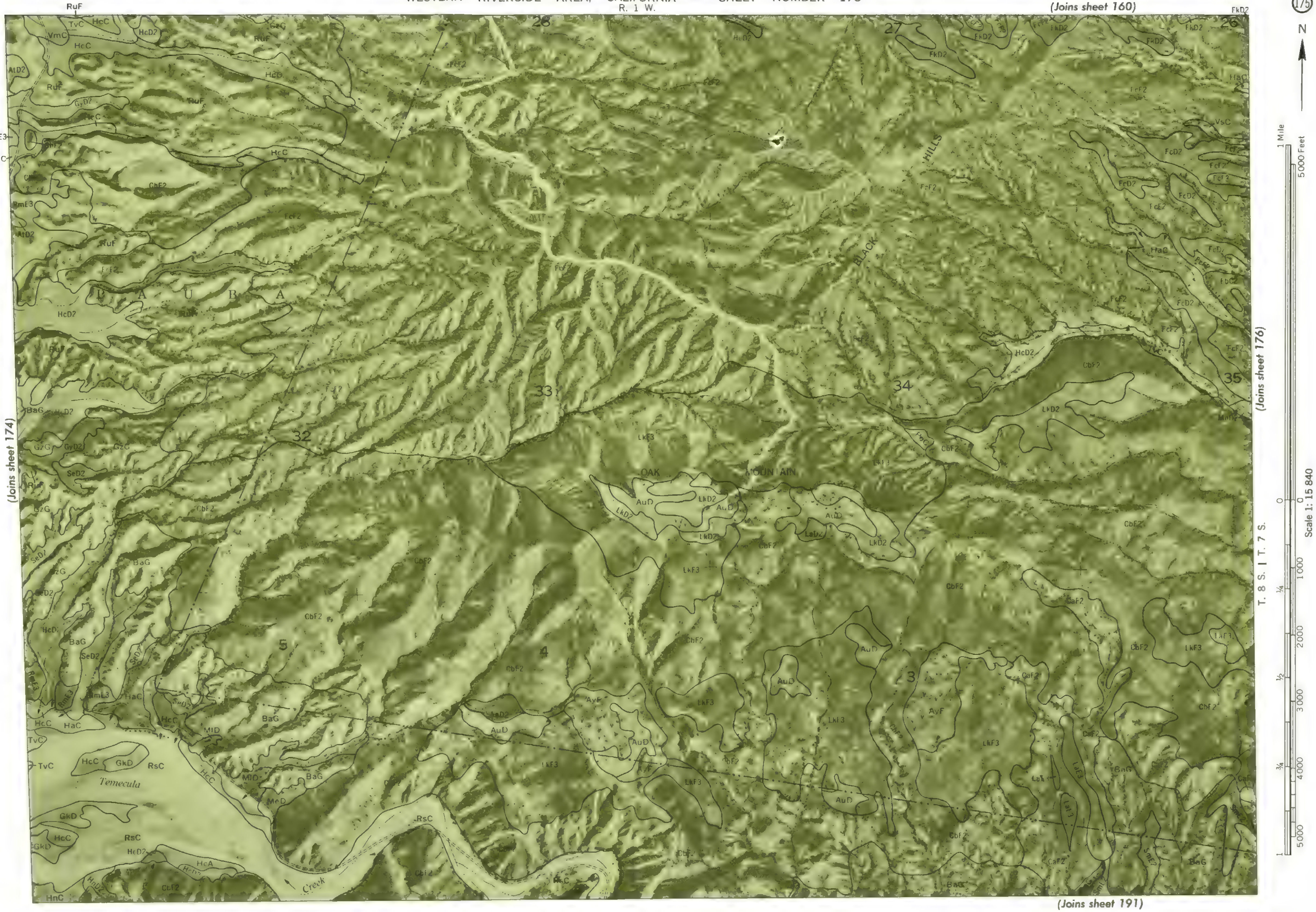
1 Mile

5000 Feet

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 174

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

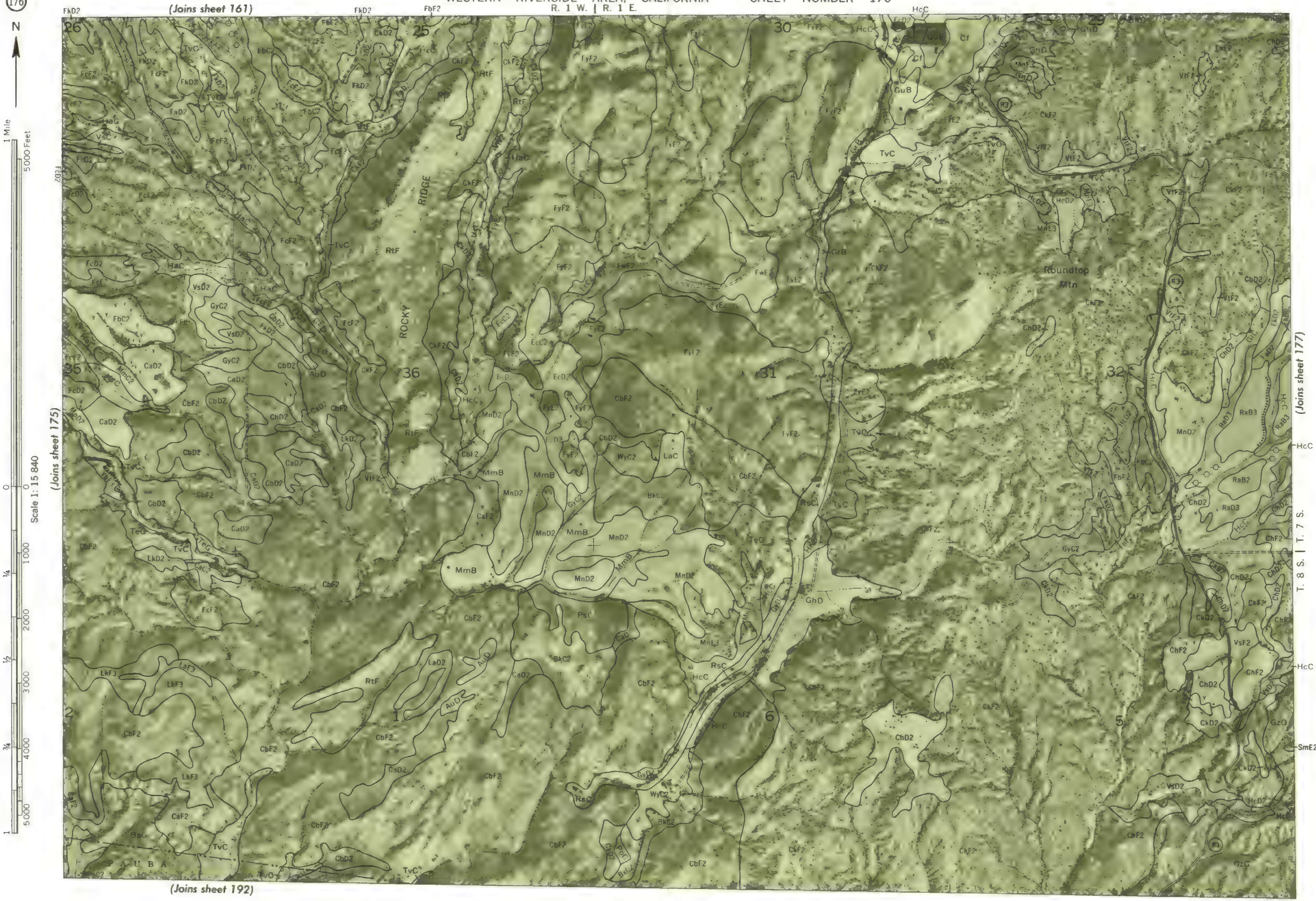


WESTERN RIVERSIDE AREA, CALIFORNIA NO. 175

Land division corners are approximately positioned on this map

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 176



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 176

Land division corners are approximately positioned on this map

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

(177)

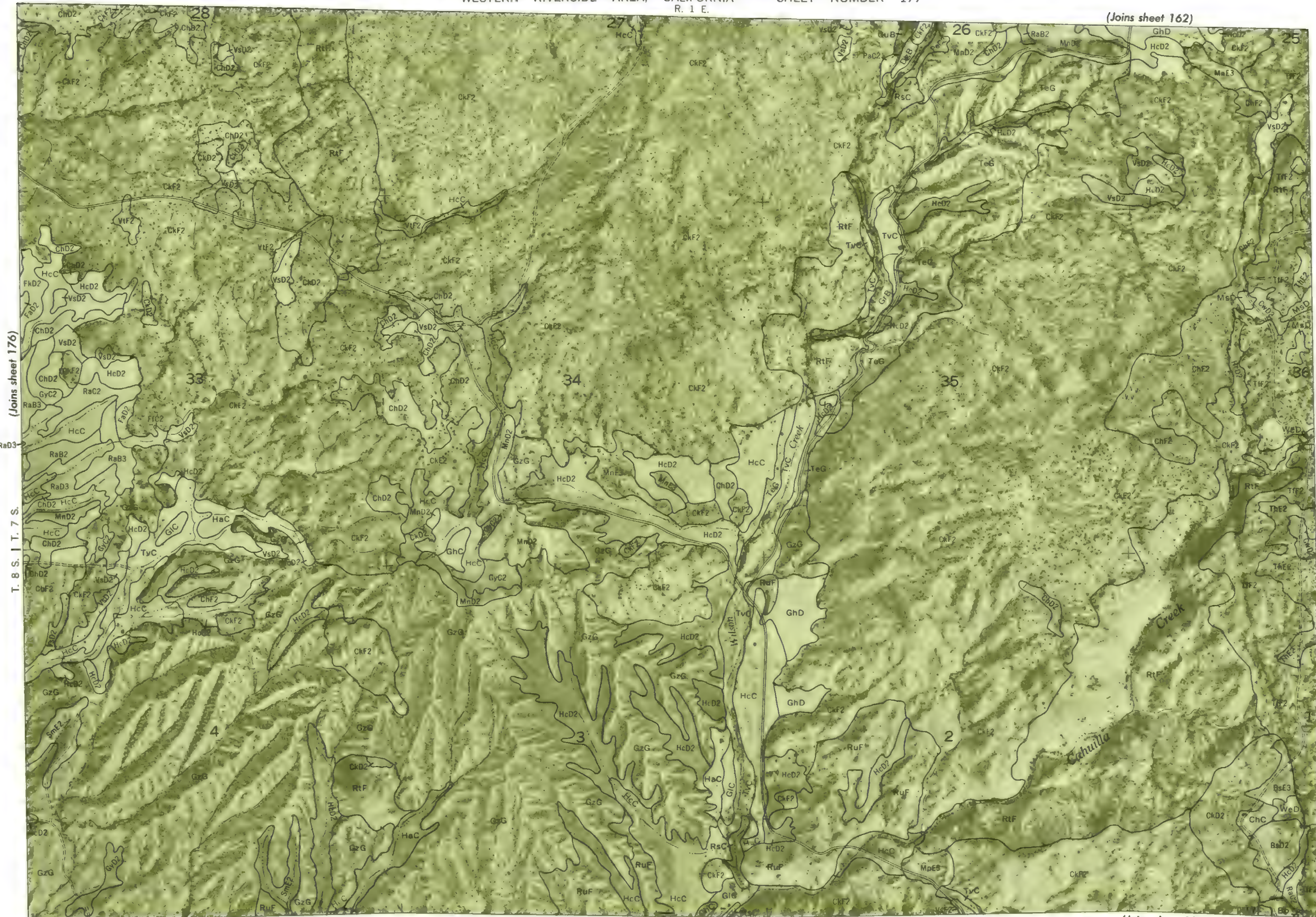
R. 1 E.

(Joins sheet 162)

(Joins sheet 176)

T. 7 S.

T. 8 S.



(Joins sheet 178)

(Joins sheet 193)

N

1 Mile

5000 Feet

Scale 1: 15 840

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 177

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 178

(Joins sheet 163) R. 1 E. | R. 2 E.

N

1 Mile 5000 Feet

Scale 1: 15 840

(Joins sheet 177)

(Joins sheet 179)

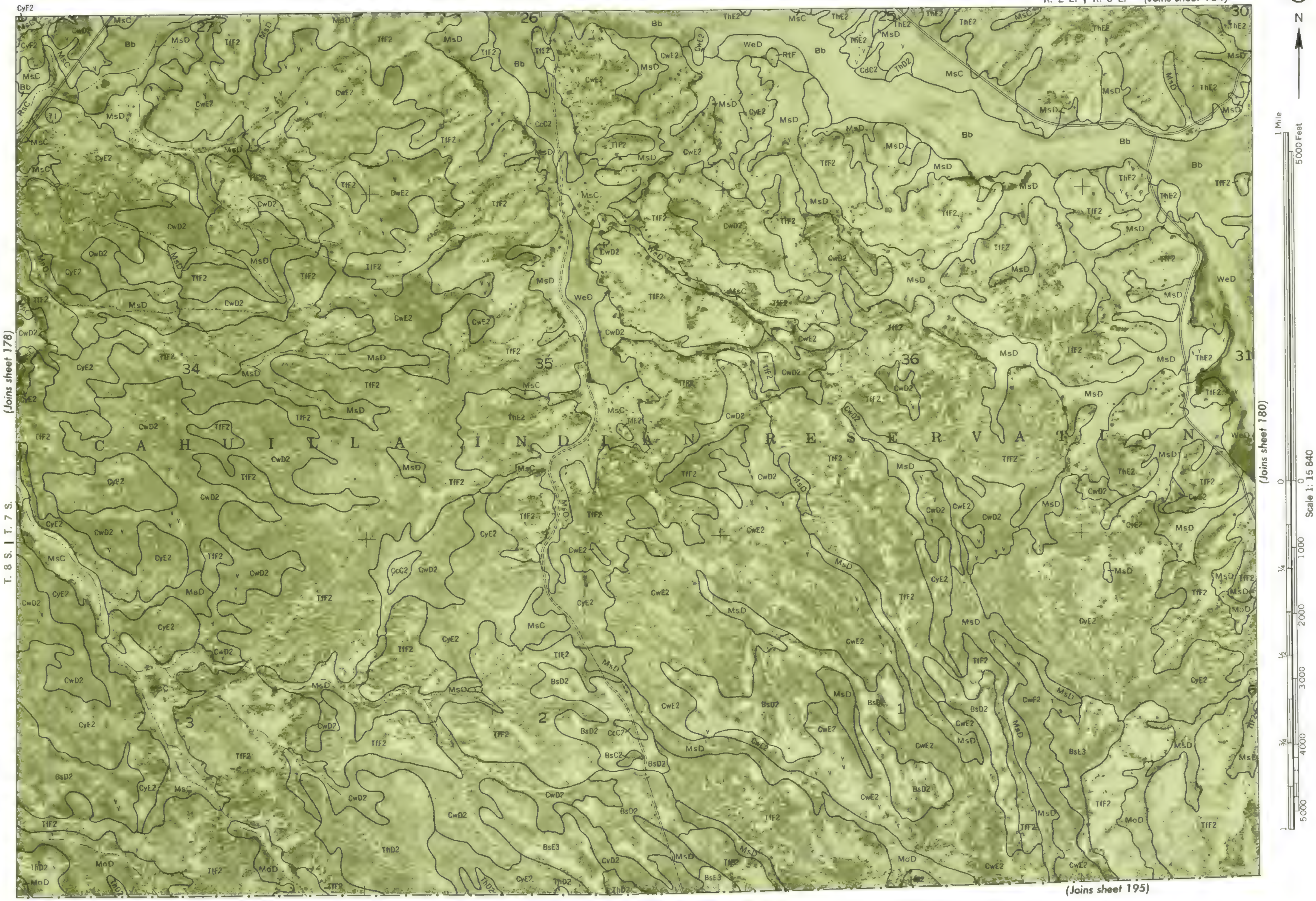
T. 7 S. | T. 8 S.

(Joins sheet 194)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 178

Land division corners are approximately positioned on this map.

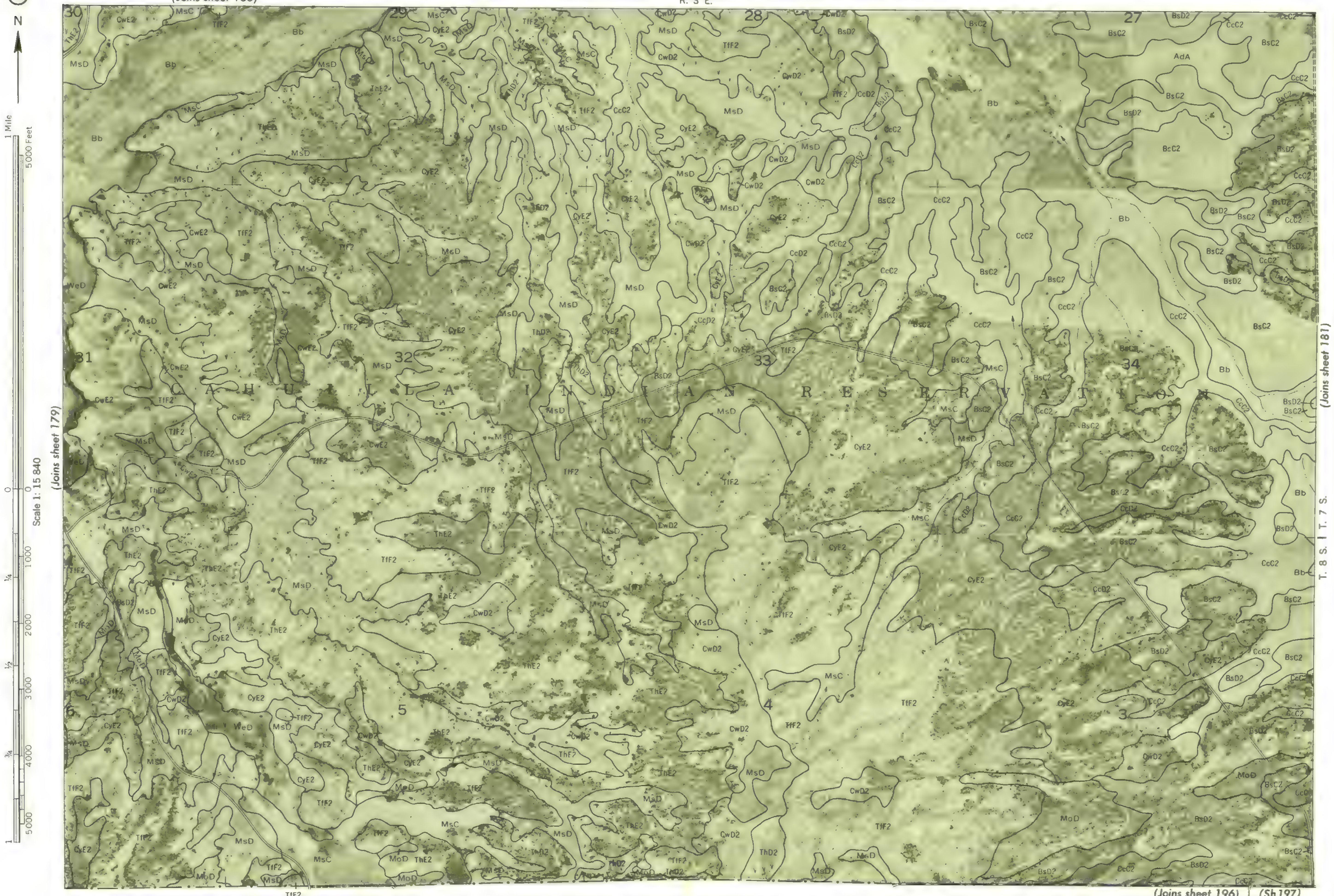
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 179

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 180

Land division corners are approximately positioned on this map.

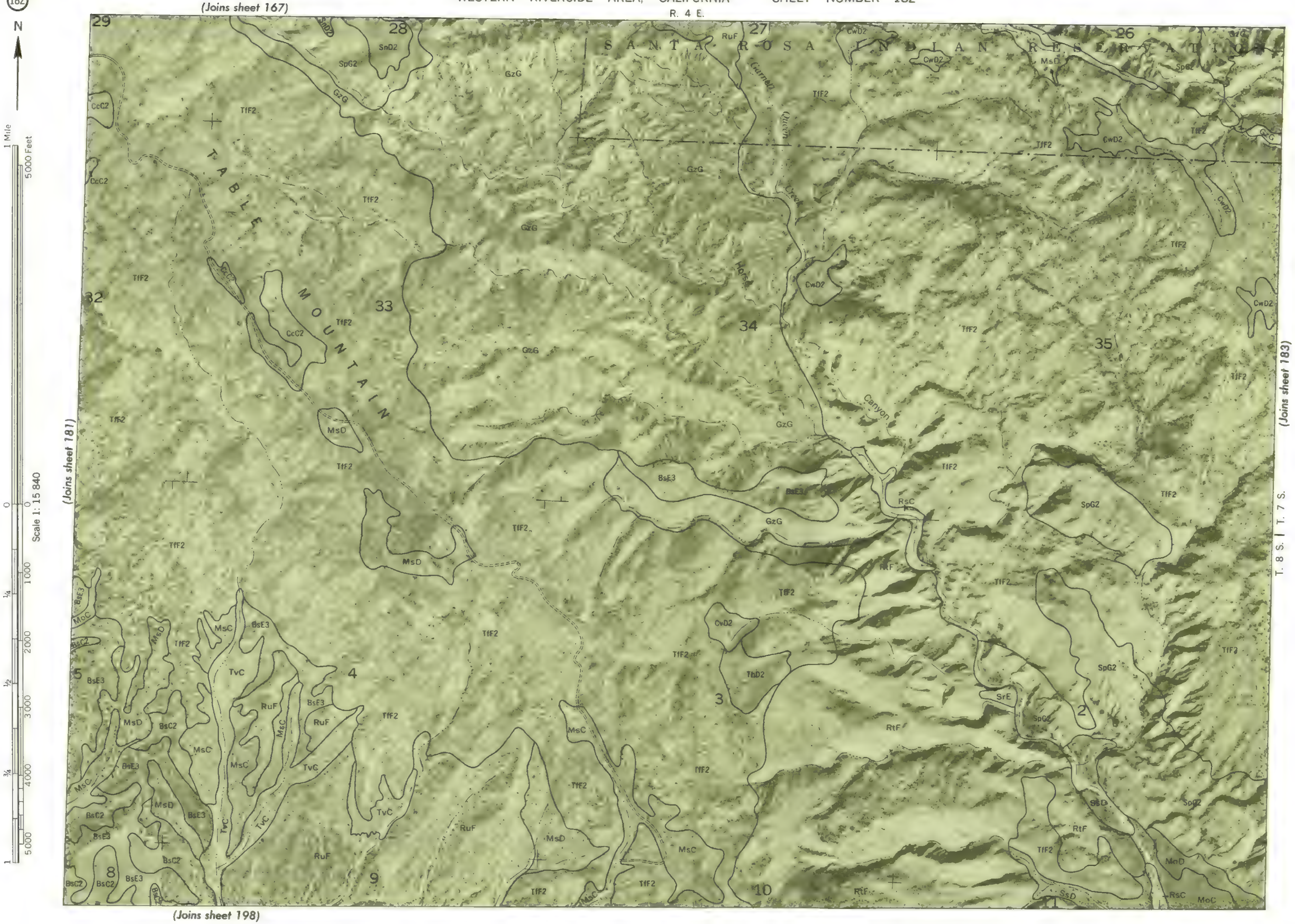
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 181

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 182



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 182

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

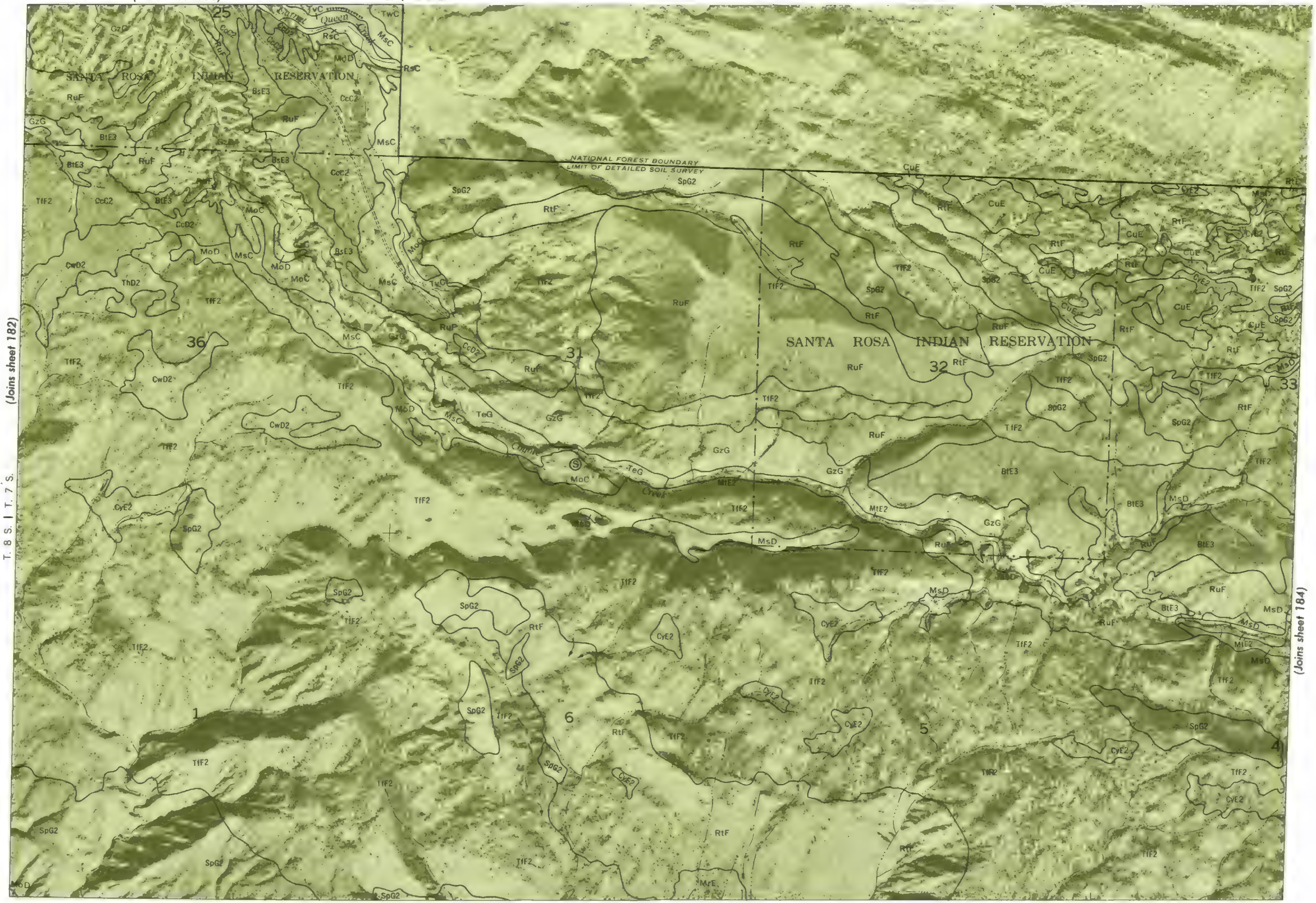
183

(Joins sheet 168)

R. 4 E. | R. 5 E.

(Joins sheet 182)

T. 8 S. | T. 7 S.



(Joins sheet 184)

(Joins sheet 199)

N

1 Mile

5000 Feet

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

Scale 1: 15 840

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 183

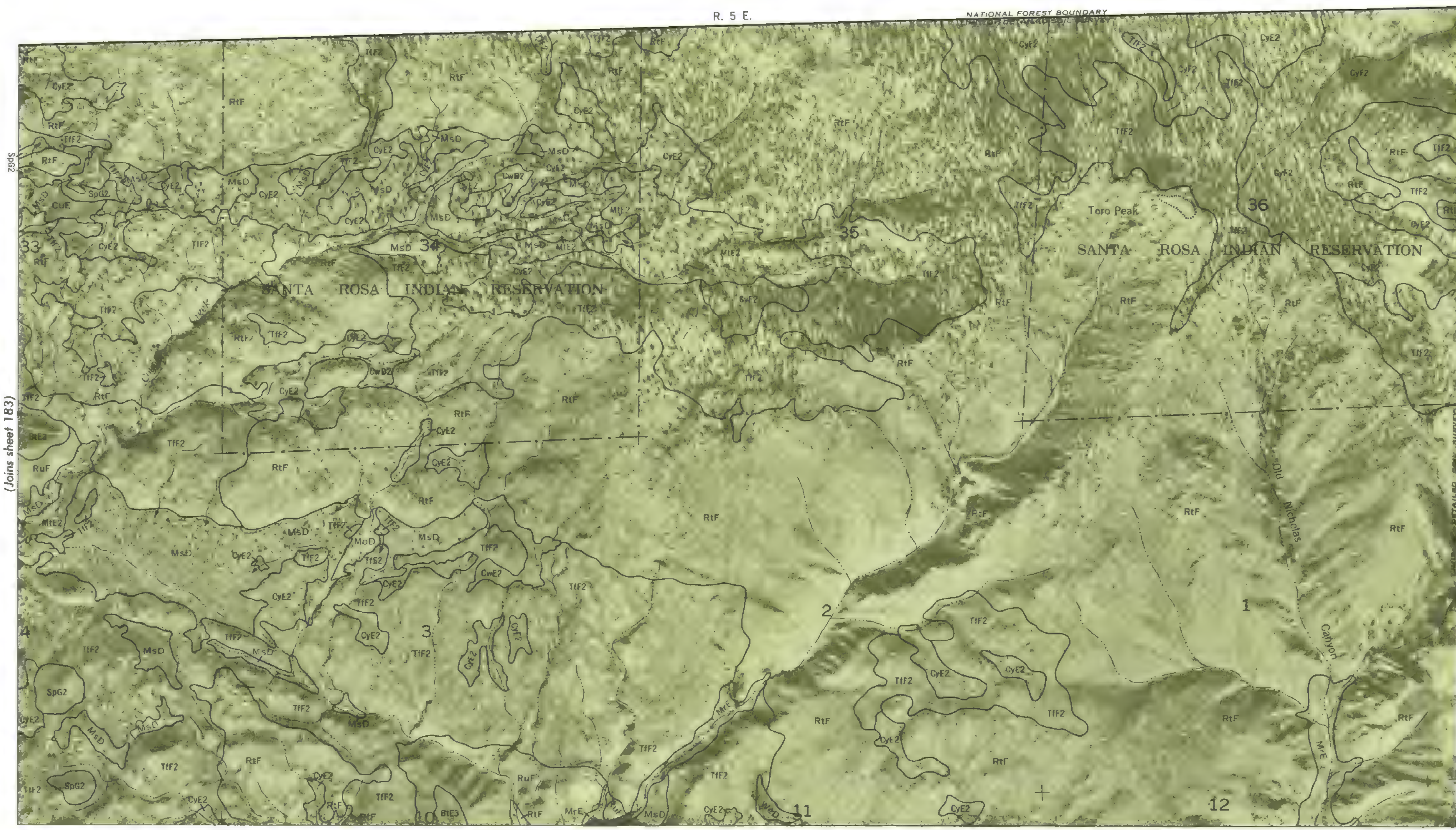
WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 184

N

Scale 1: 15 840

1 Mile 5000 Feet

(Joins sheet 183)

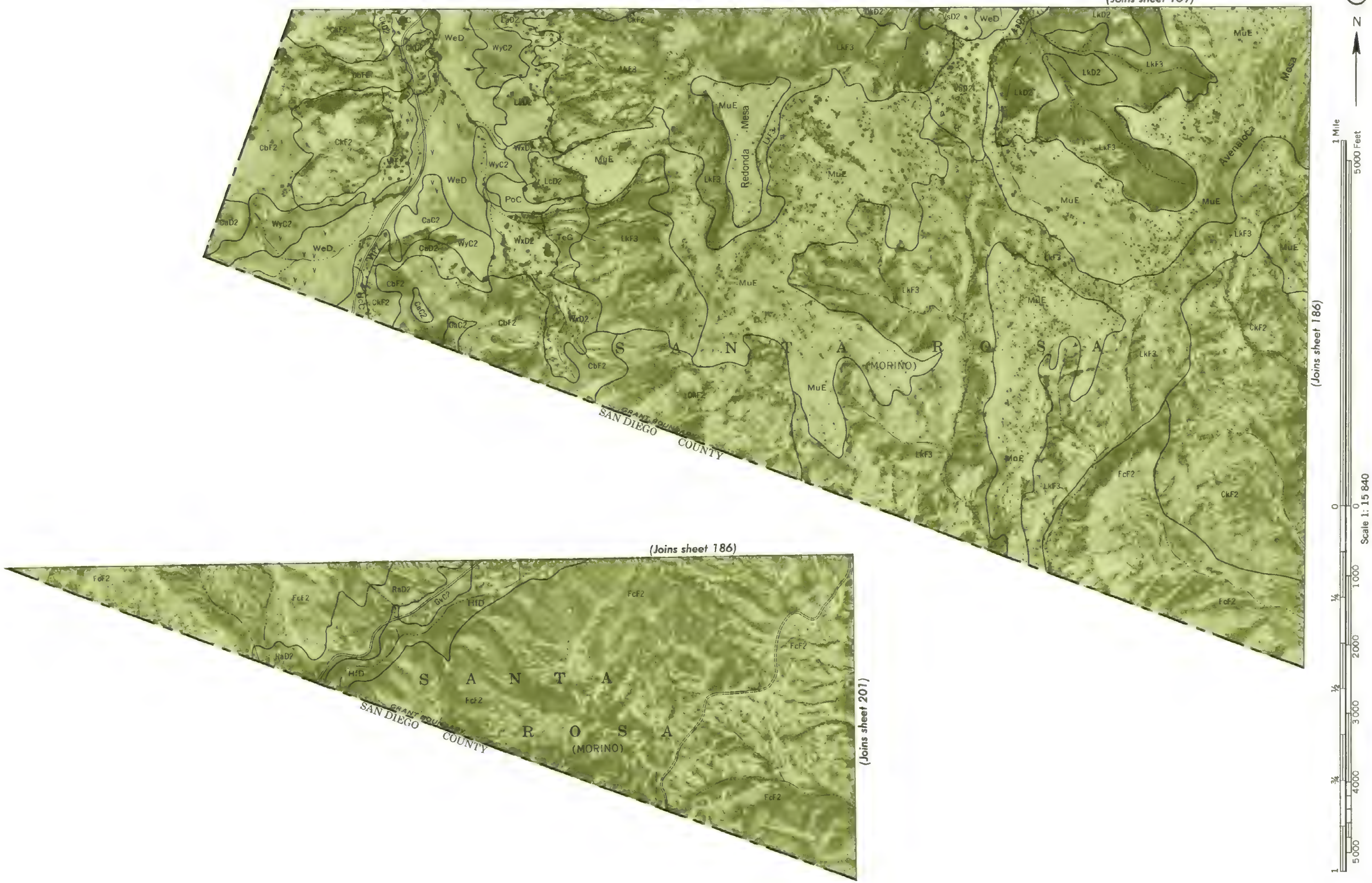


(Joins sheet 200)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 184

Land division corners are approximately positioned on this map

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 185
Land division corners are approximately positioned on this map.
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 186

N

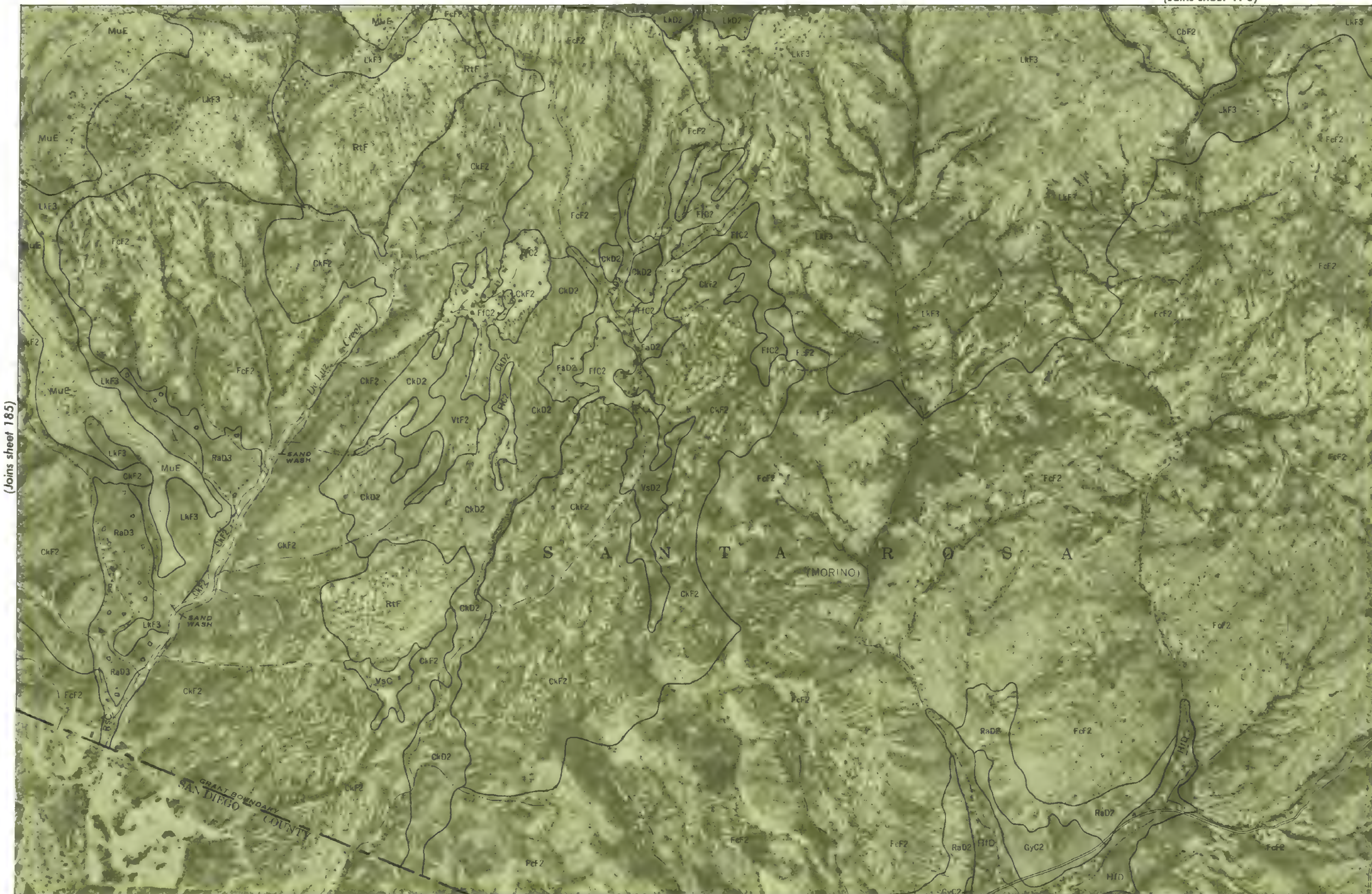
1 Mile

5000 Feet

Scale 1: 15 840

(Joins sheet 170)

(Joins sheet 185)



(Joins sheet 187)

(Joins inset, sheet 185)

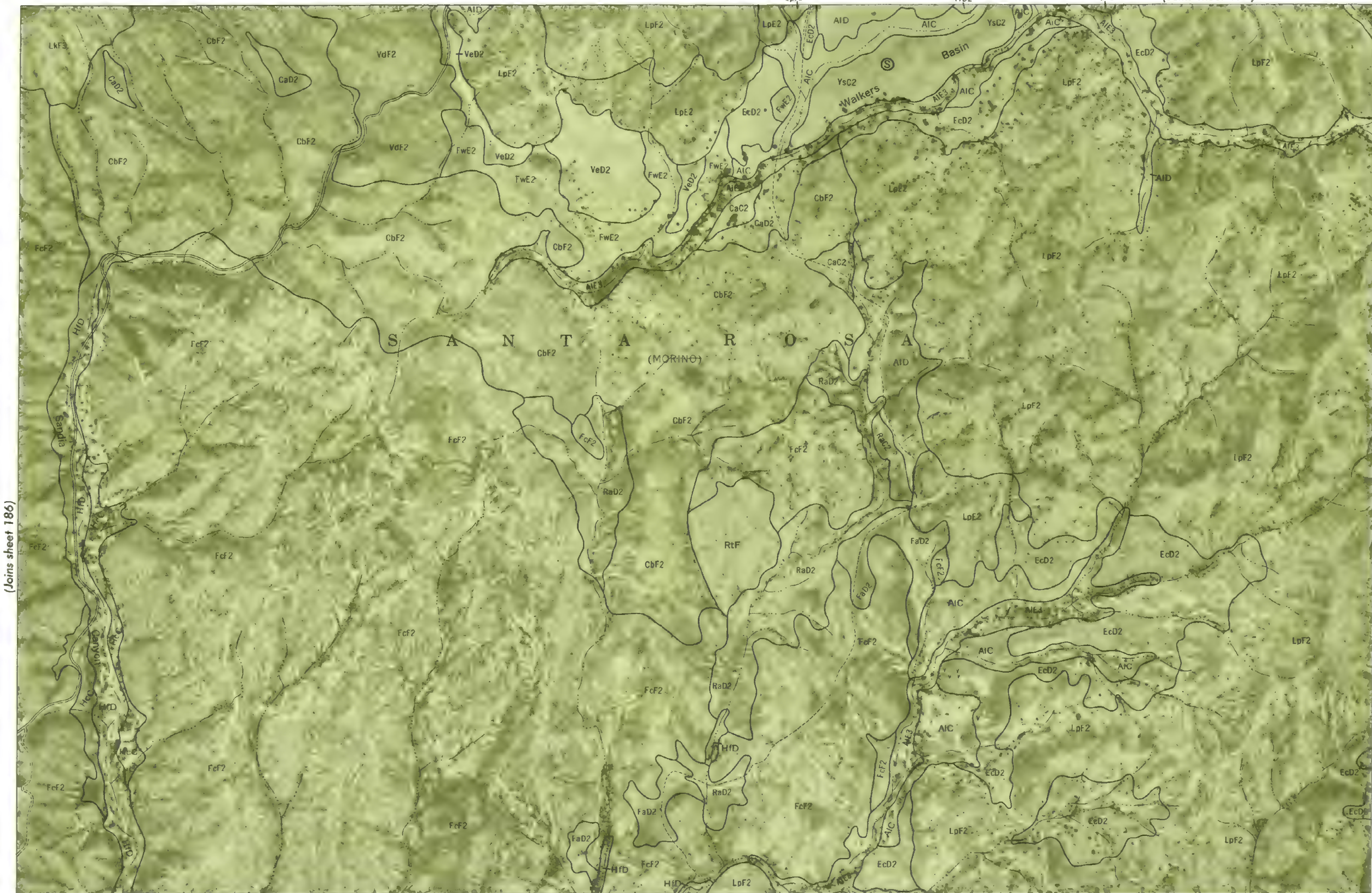
WESTERN RIVERSIDE AREA, CALIFORNIA NO. 186

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

(Joins sheet 171)

(Joins sheet 186)



(Joins sheet 188)

(Joins sheet 201)

N

Scale 1: 15 840

0 — 1/4 — 1/2 — 3/4 — 1 Mile

0 — 1000 — 2000 — 3000 — 4000 — 5000 Feet

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 187

Land division corners are approximately positioned on this map

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 188

N

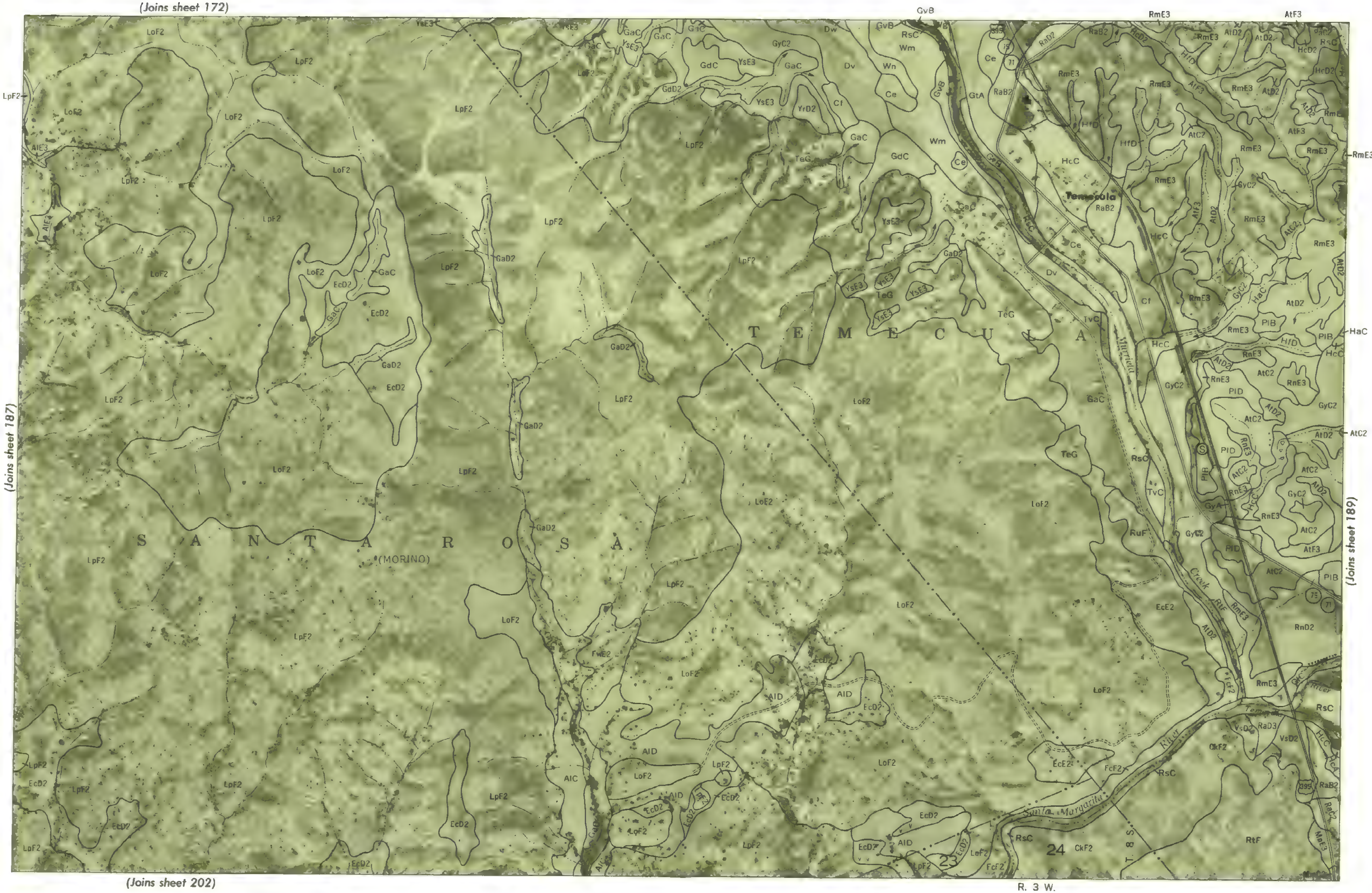
1 Mile

5000 Feet

Scale 1: 15 840

0 ¼ ½ ¾ 1

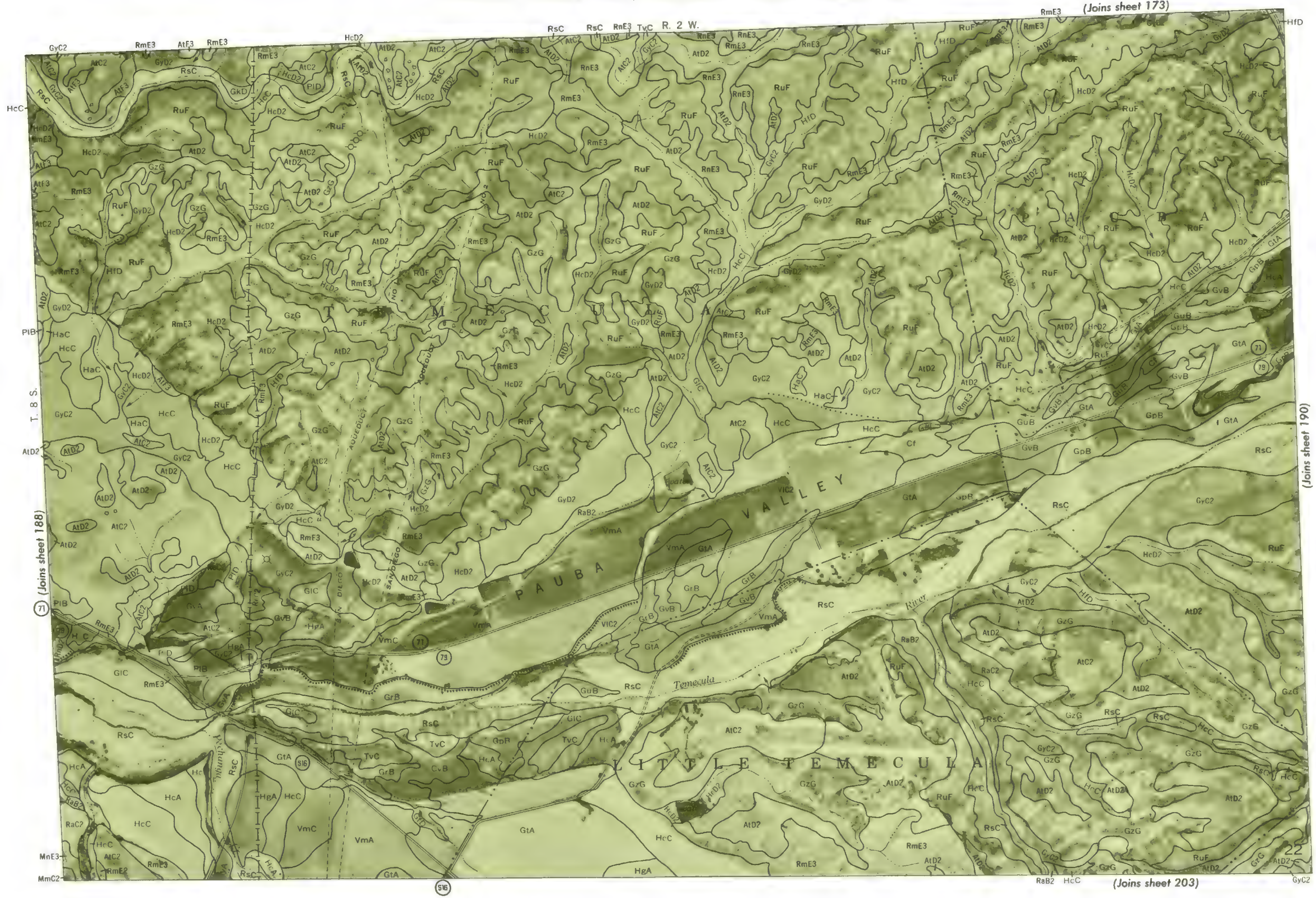
0 1000 2000 3000 4000 5000



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 188

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

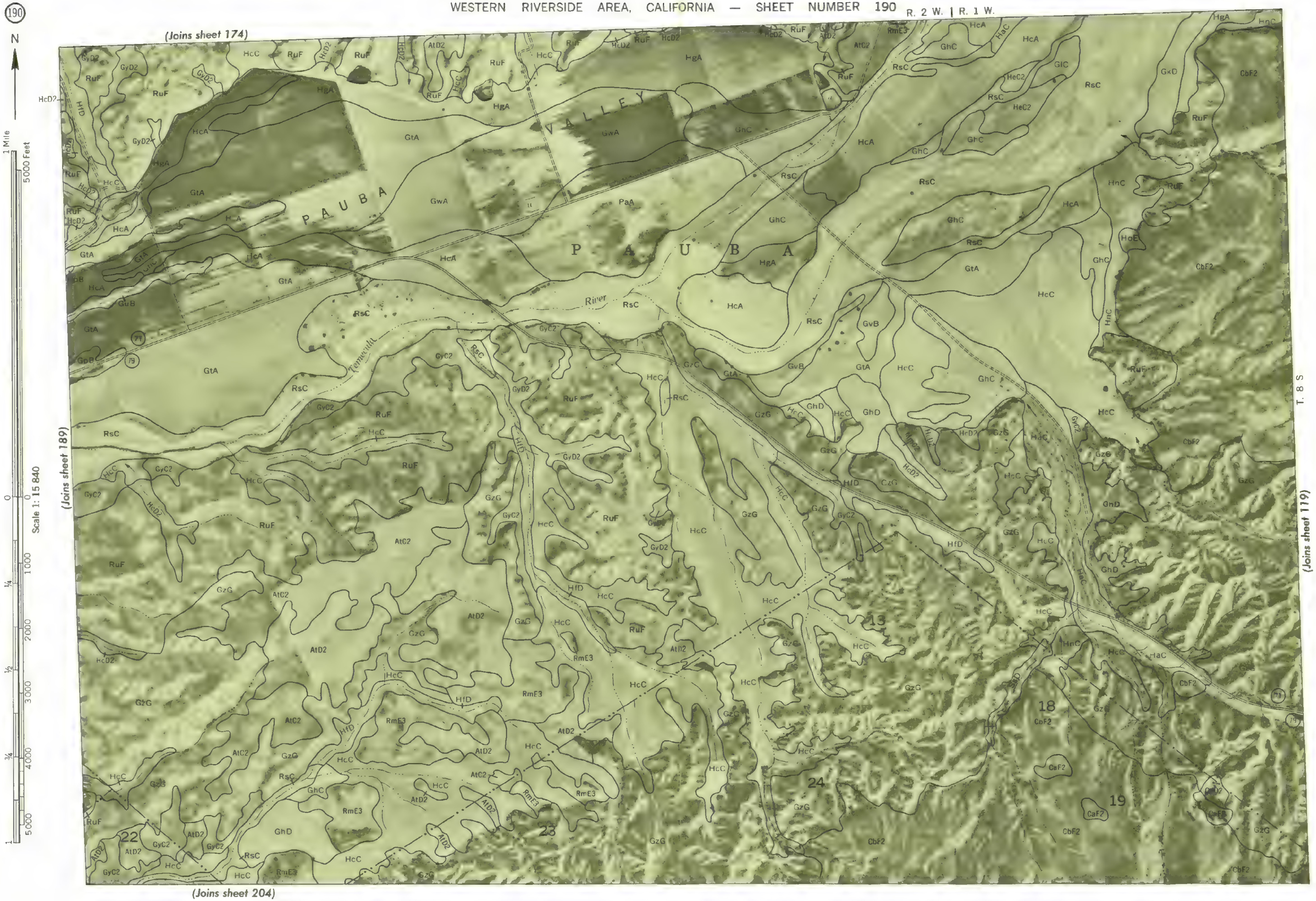


N

1 Mile
5000 Feet
0 1000 2000 3000 4000 5000
0 1/4 1/2 3/4 1
Scale 1: 15 840

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 190

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

(Joins sheet 175)

(Joins sheet 190)

(Joins sheet 192)

(Joins sheet 205)

HdD2

R. 1 W.

N

Scale 1: 15 840

1 Mile

5000 Feet

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 191

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 192

N

Scale 1: 15 840

1 Mile | 3/4 | 1/2 | 1/4 | 0

5000 Feet | 4000 | 3000 | 2000 | 1000 | 0

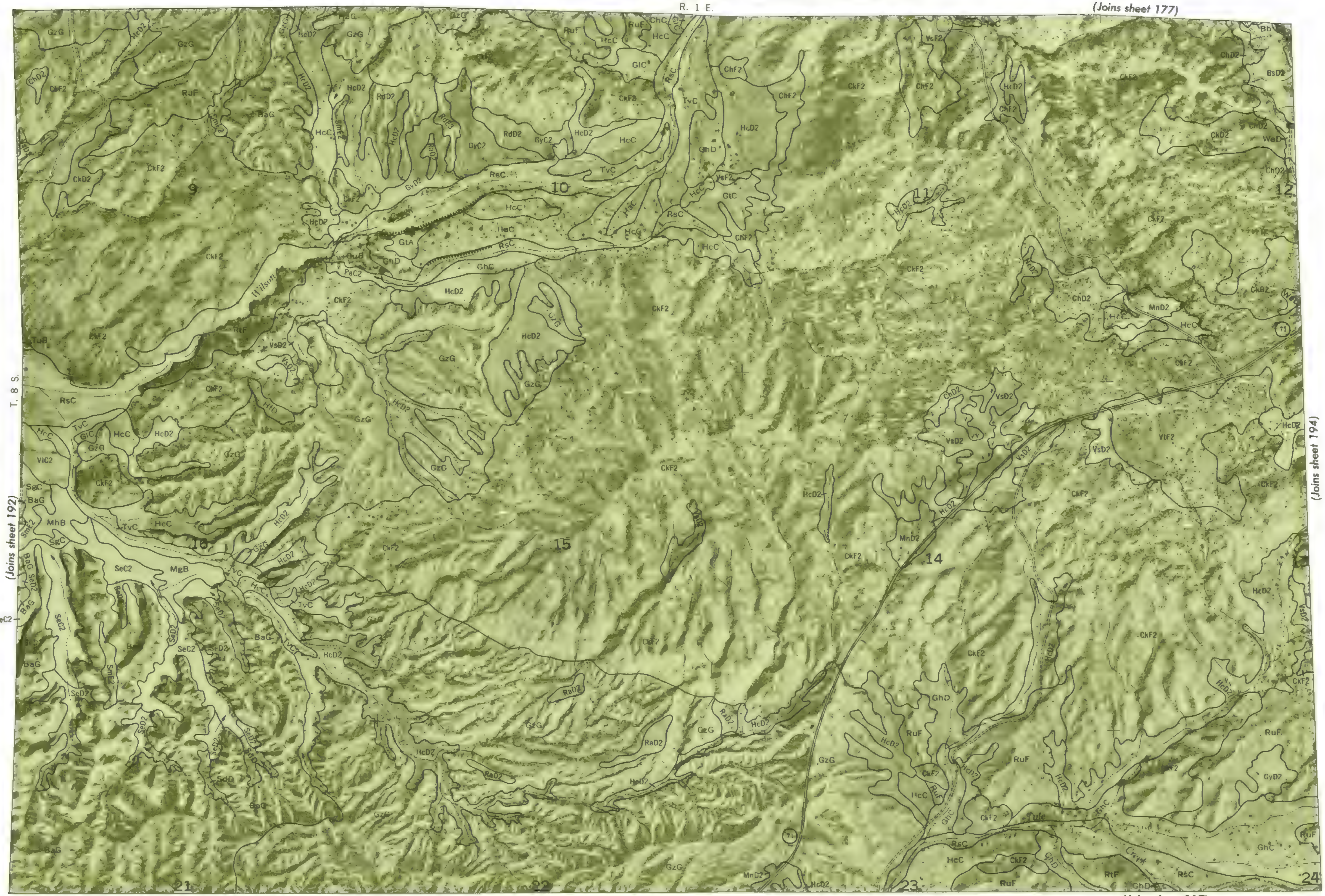
WESTERN RIVERSIDE AREA, CALIFORNIA NO. 192

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

R. 1 E.

(Joins sheet 177)



N

Scale 1:15 840

1 Mile

5000 Feet

0 ¼ ½ ¾ 1

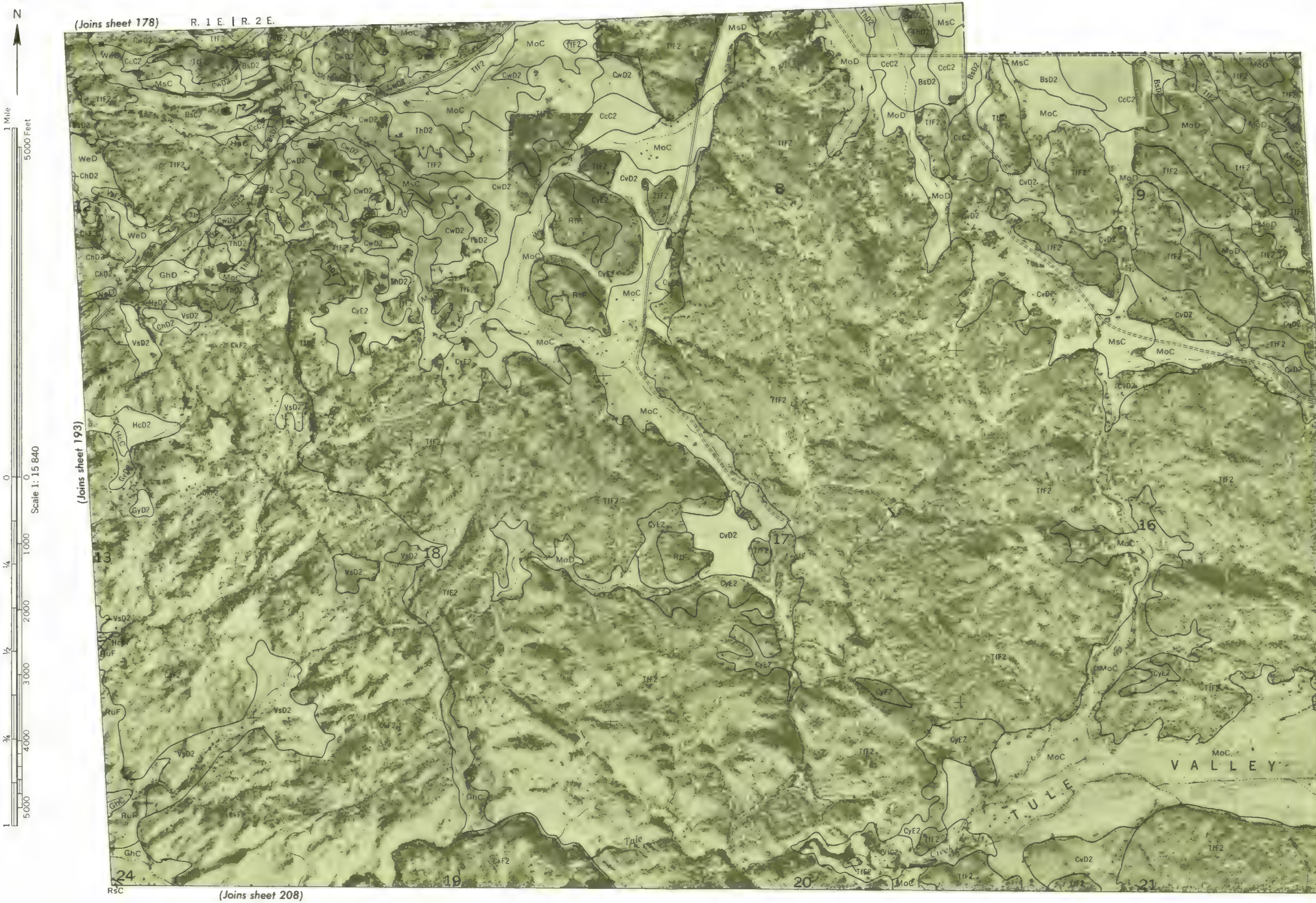
0 1000 2000 3000 4000 5000

SeC2

WESTERN RIVERSIDE AREA, CALIFORNIA, NO. 193

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 194

Land division corners are approximately positioned on this map.

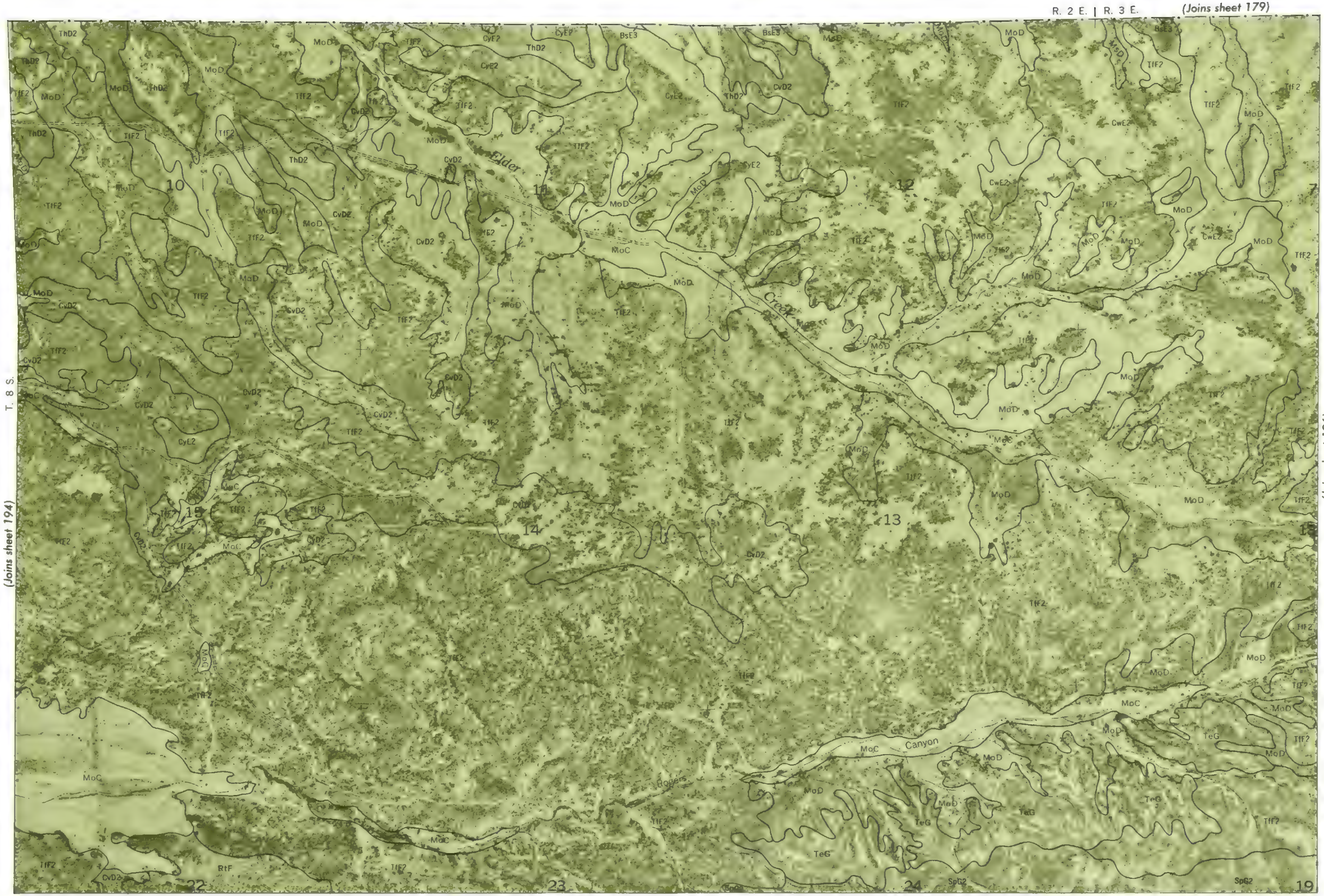
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 195

R. 2 E. | R. 3 E. (Joins sheet 179)



N

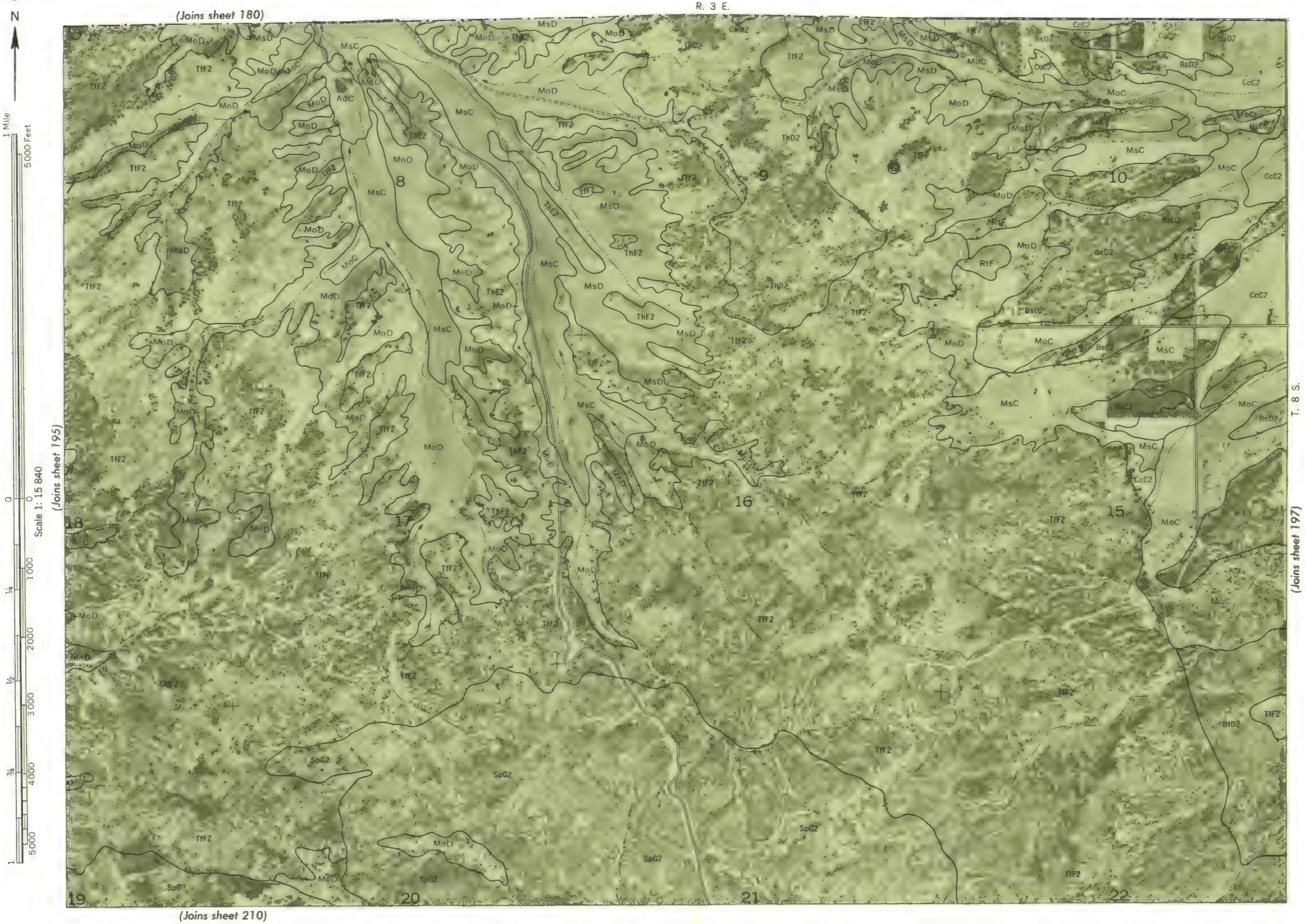
Scale 1: 15 840

1 Mile

5000 Feet

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 196

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

197

N

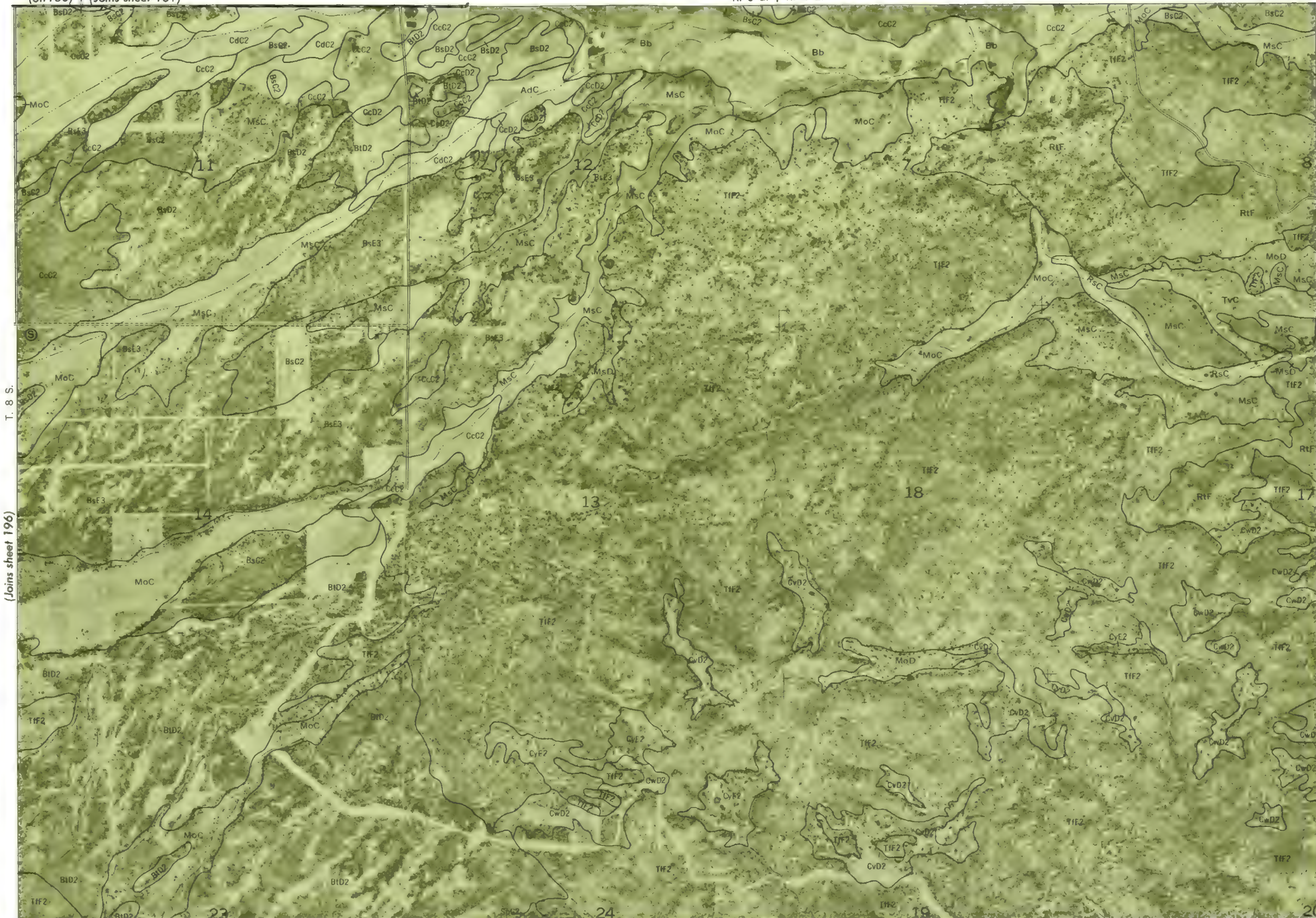
(Sh 180) | (Joins sheet 181)

R. 3 E. | R. 4 E.

T. 8 S.

(Joins sheet 196)

(Joins sheet 198)



(Joins sheet 211)

1 Mile

5000 Feet

Scale 1: 15 840

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

This map is one of [illegible] compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 197

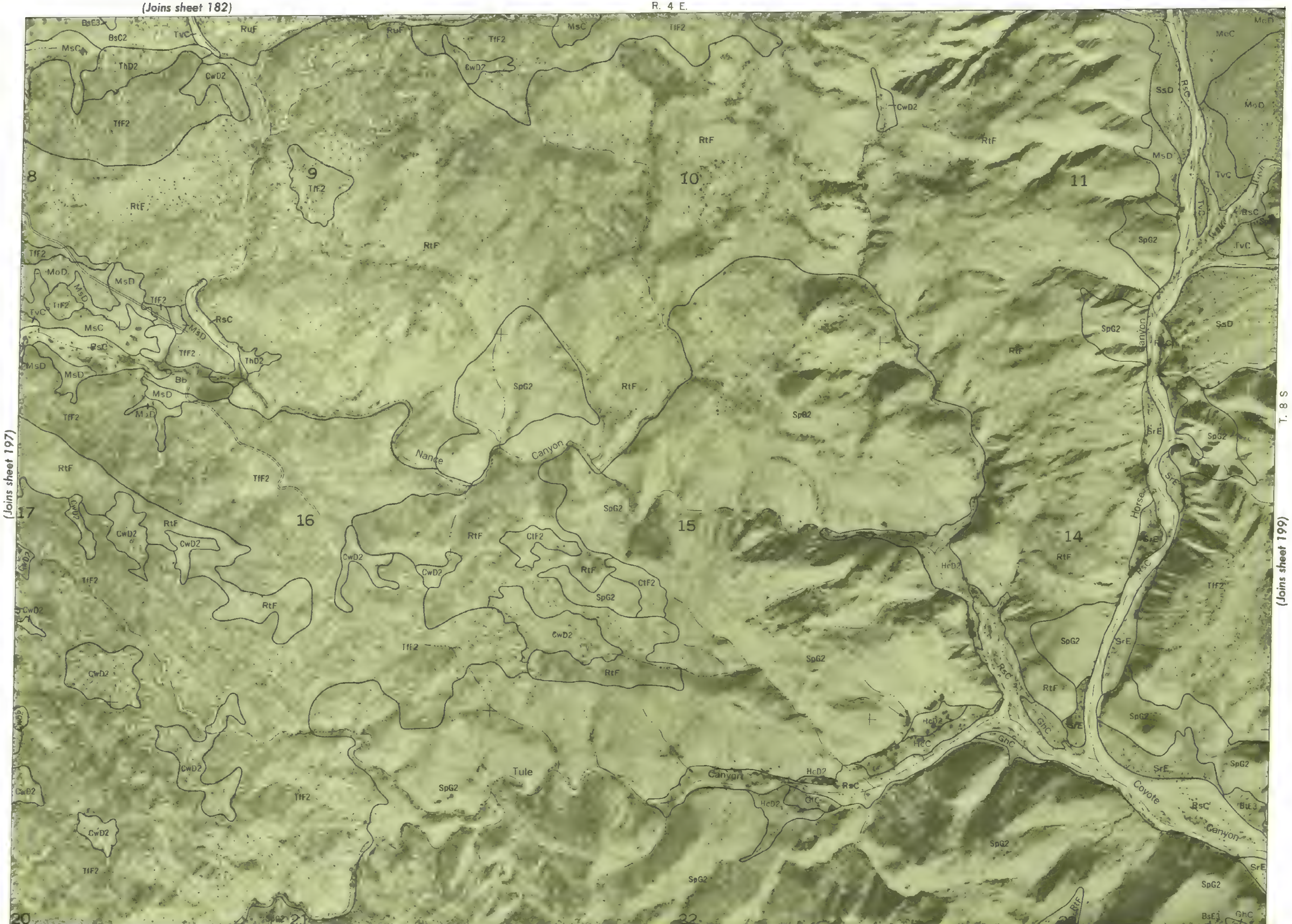
N

(Joins sheet 182)

R. 4 E.

1 Mile
5000 Feet
Scale 1: 15 840

(Joins sheet 197)



T. 8 S.

(Joins sheet 199)

(Joins sheet 212)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 198

Land division corners are approximately positioned on this map.

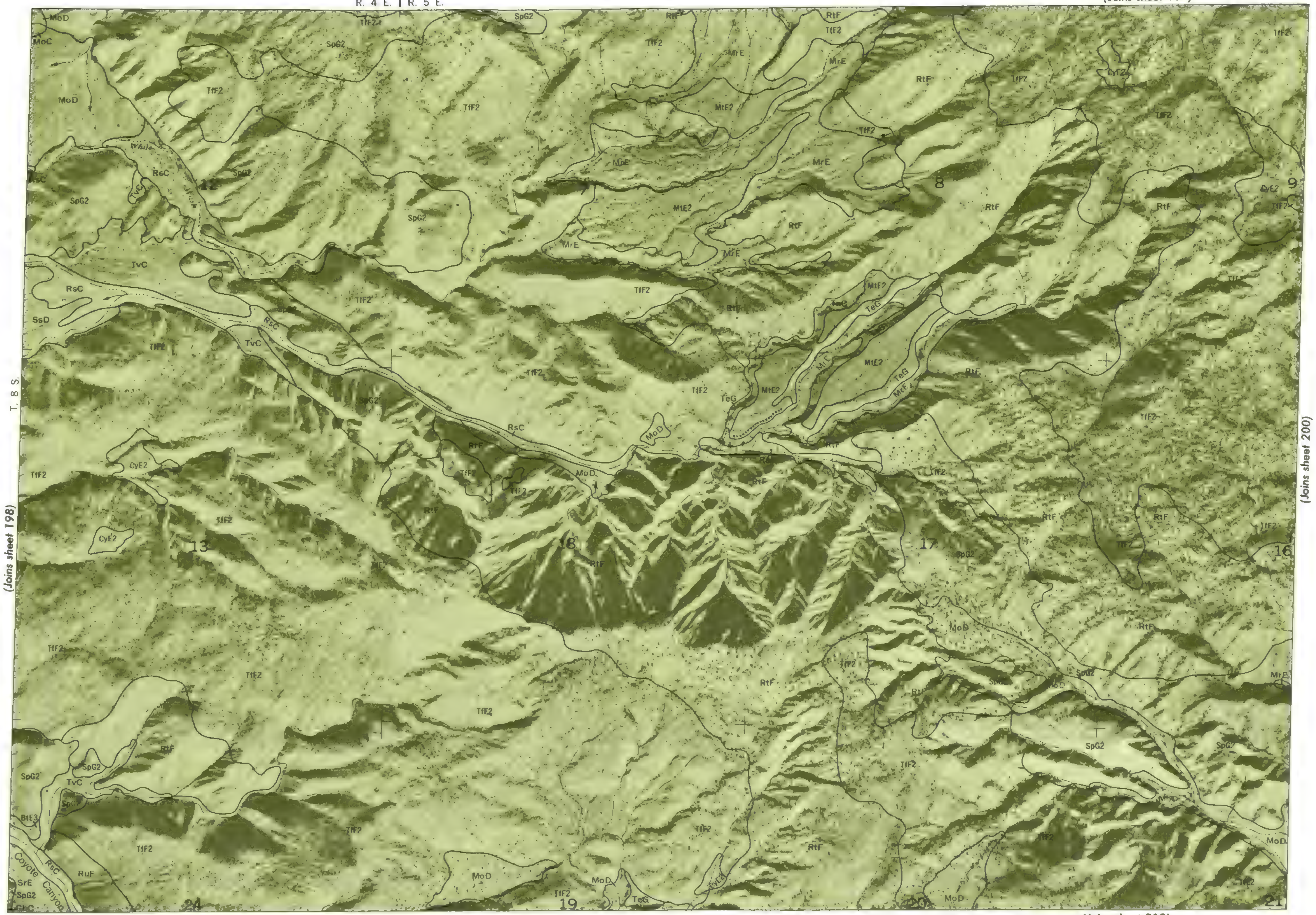
This map is one of ... compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

199

R. 4 E. | R. 5 E.

(Joins sheet 183)

N



(Joins sheet 198)

(Joins sheet 200)

(Joins sheet 213)

1 Mile
5000 Feet
Scale 1: 15 840
0 ¼ ½ ¾ 1
0 1000 2000 3000 4000 5000

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

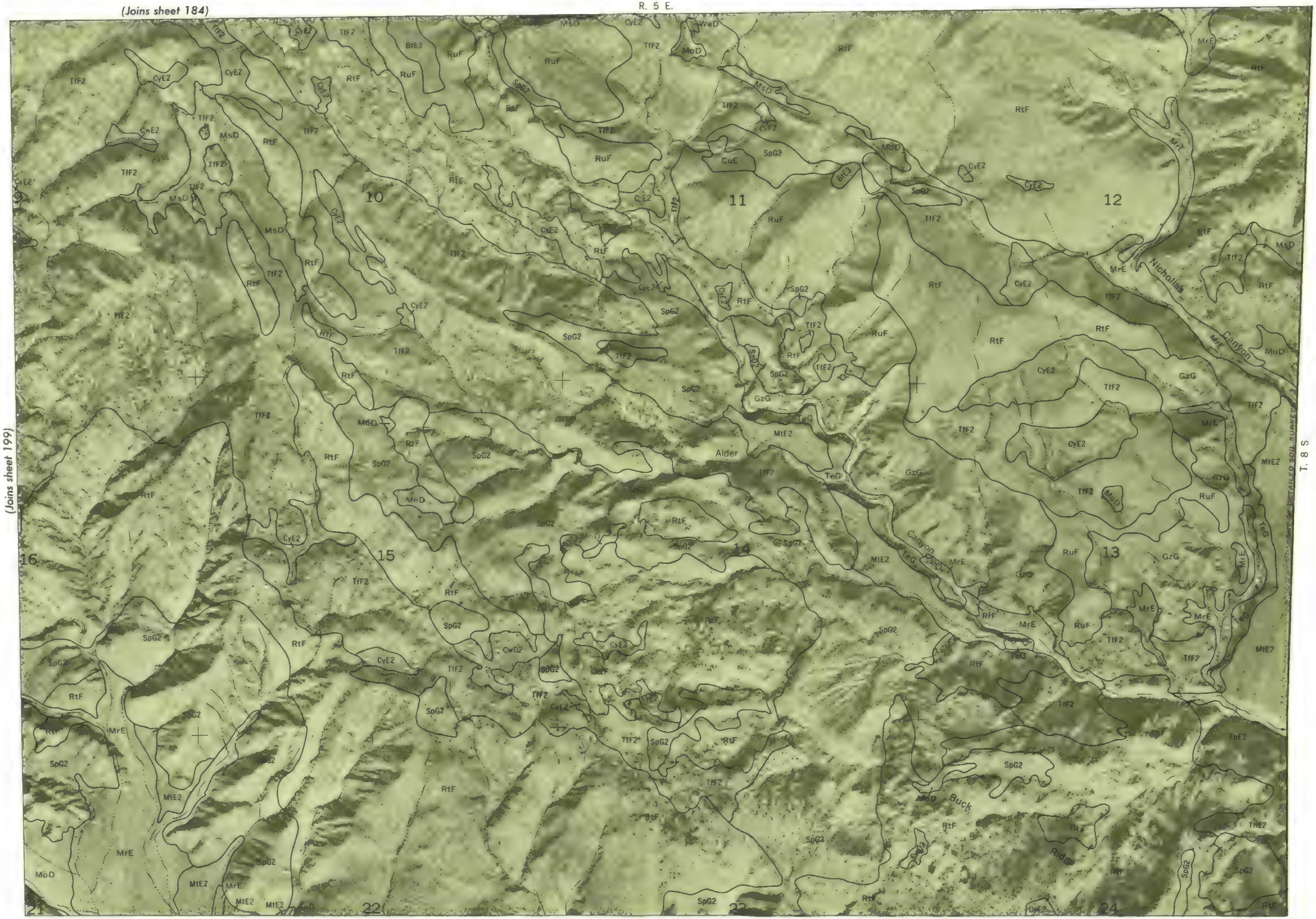
Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 199

R. 5 E.

N

(Joins sheet 184)



(Joins sheet 199)

(Joins sheet 214)

1 Mile
5000 Feet
Scale 1:15 840
0 ¼ ½ ¾ 1
0 1000 2000 3000 4000 5000

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 200

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 201

(Joins sheet 187)

(Joins inset, sheet 185)

(Joins sheet 202)

T. 8 S.

SAN DIEGO COUNTY

R. 3 W.

N

1 Mile ½ ¼ 0

5000 Feet 4000 3000 2000 1000 0 5000

Scale 1: 15 840

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 202

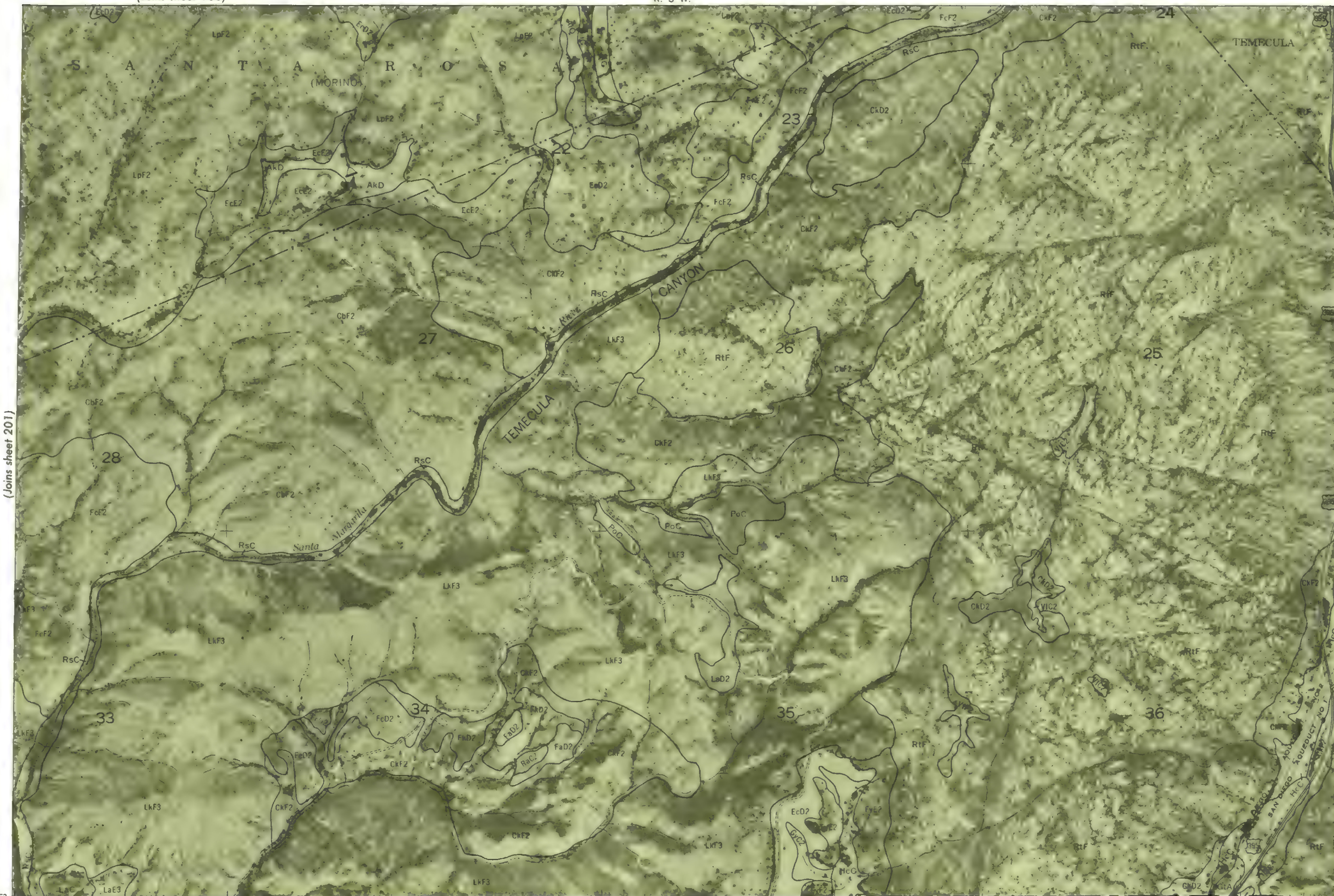
N

1 Mile
5000 Feet
Scale 1: 15 840

(Joins sheet 188)

R. 3 W.

(Joins sheet 201)



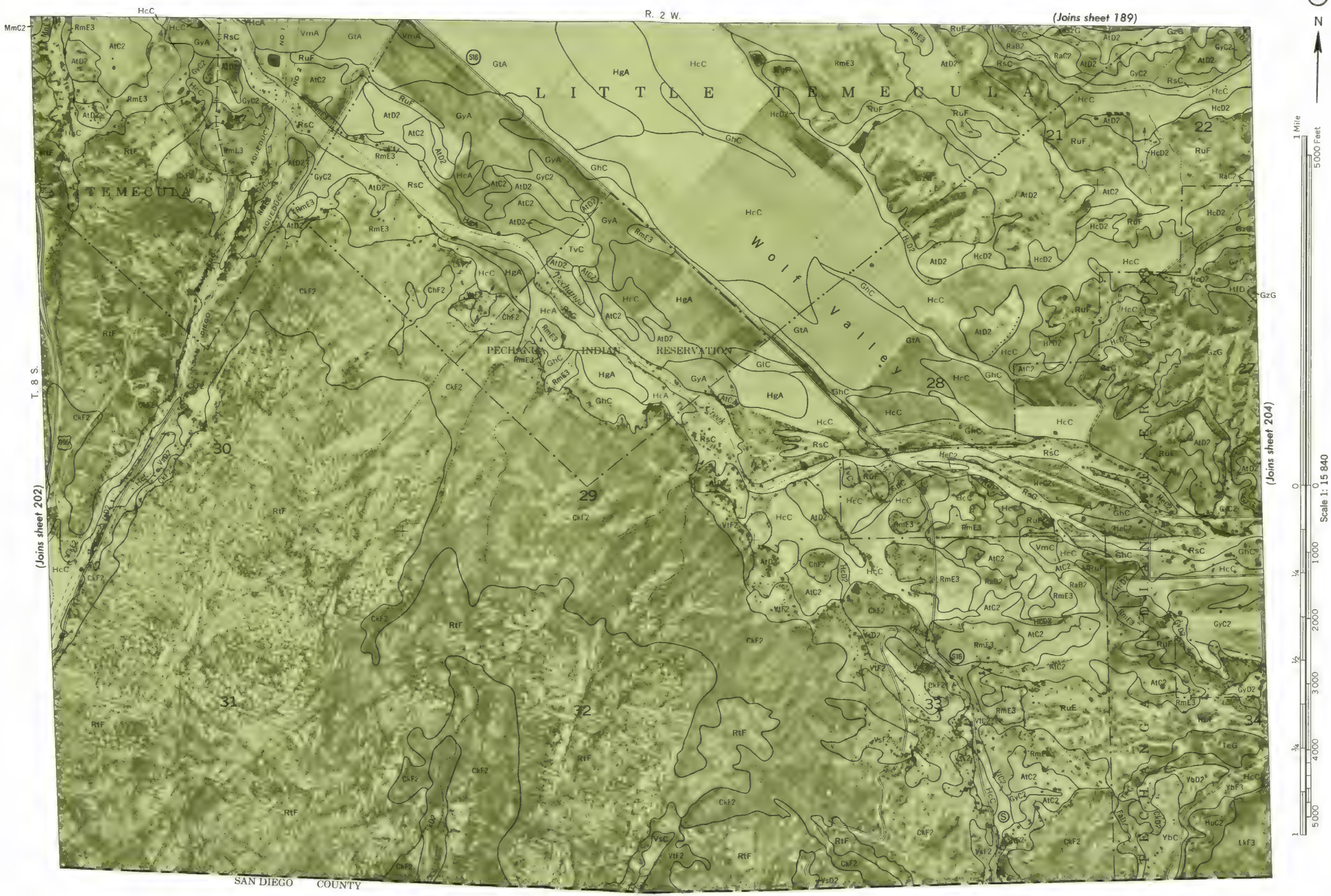
T. 8 S.

(Joins sheet 203)

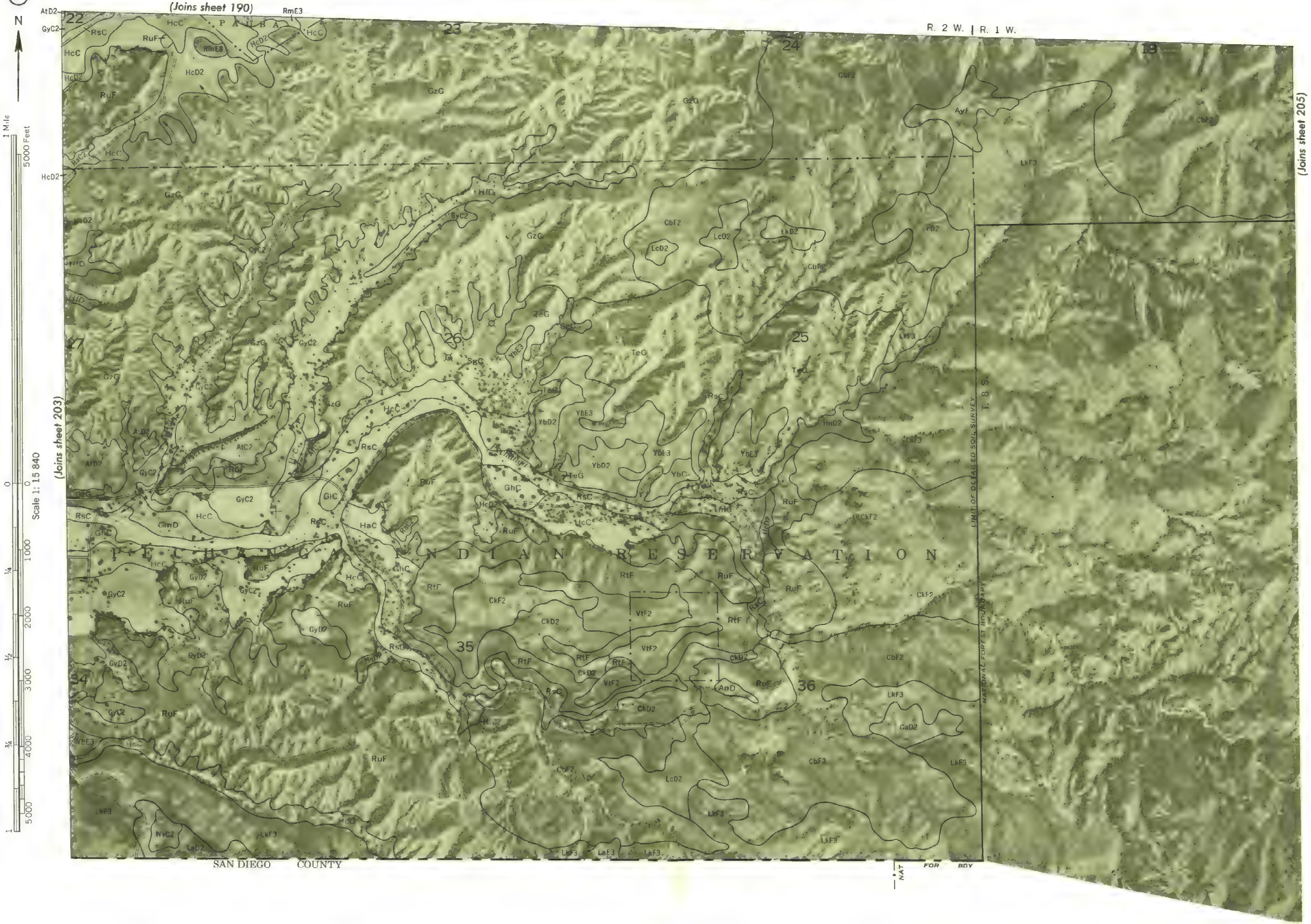
WESTERN RIVERSIDE AREA, CALIFORNIA NO. 202

Land division corners are approximately positioned on this map

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station



This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.
Land division corners are approximately positioned on this map.



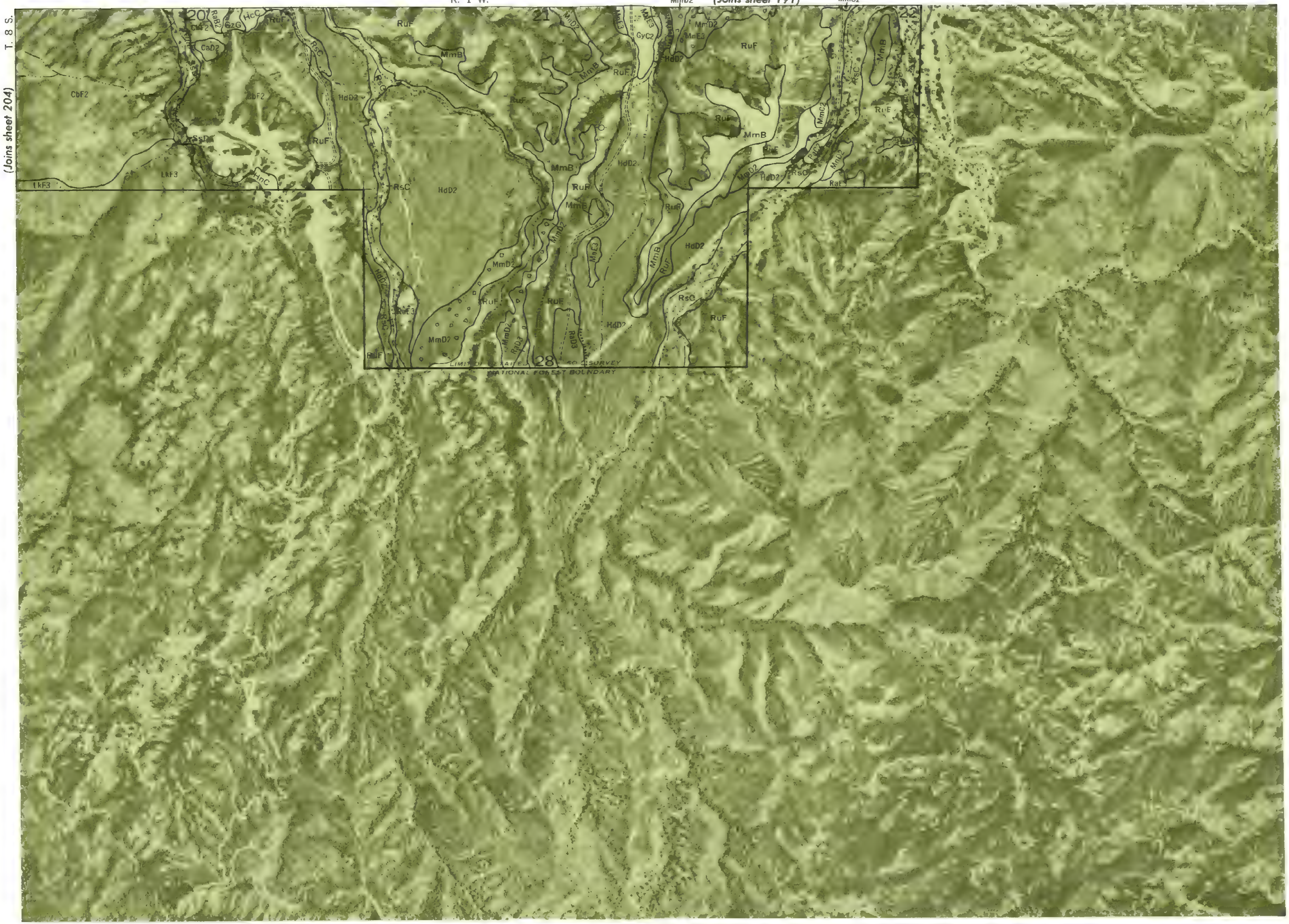
WESTERN RIVERSIDE AREA, CALIFORNIA NO. 204

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 205

205



N

1 Mile

5000 Feet

Scale 1: 15 840

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 205

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 206

(Joins sheet 192)

R. 1 W. | R. 1 E.

N

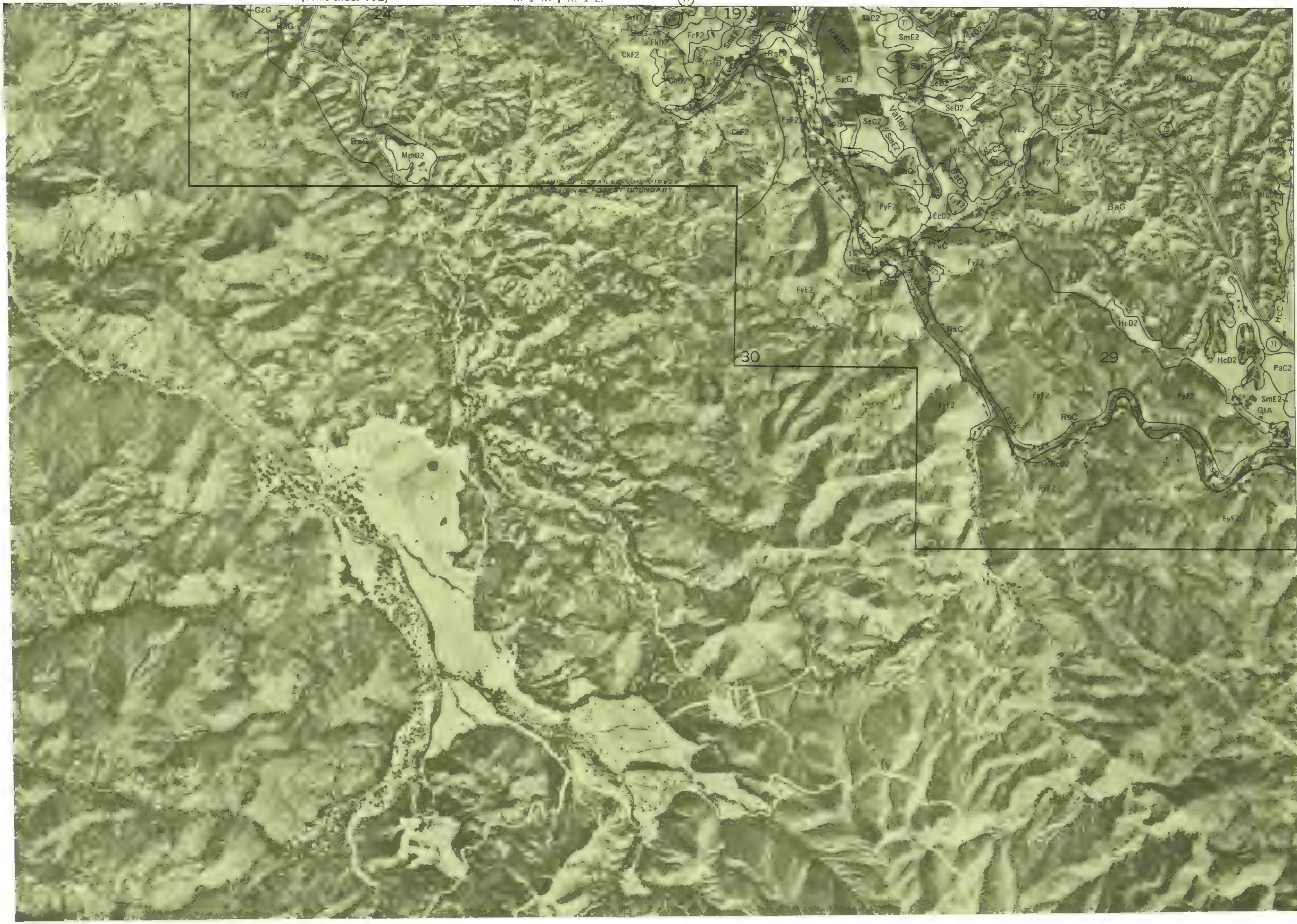
1 Mile

5000 Feet

0

Scale 1: 15 840

1000 ¼ 2000 ½ 3000 ¾ 4000 5000 1



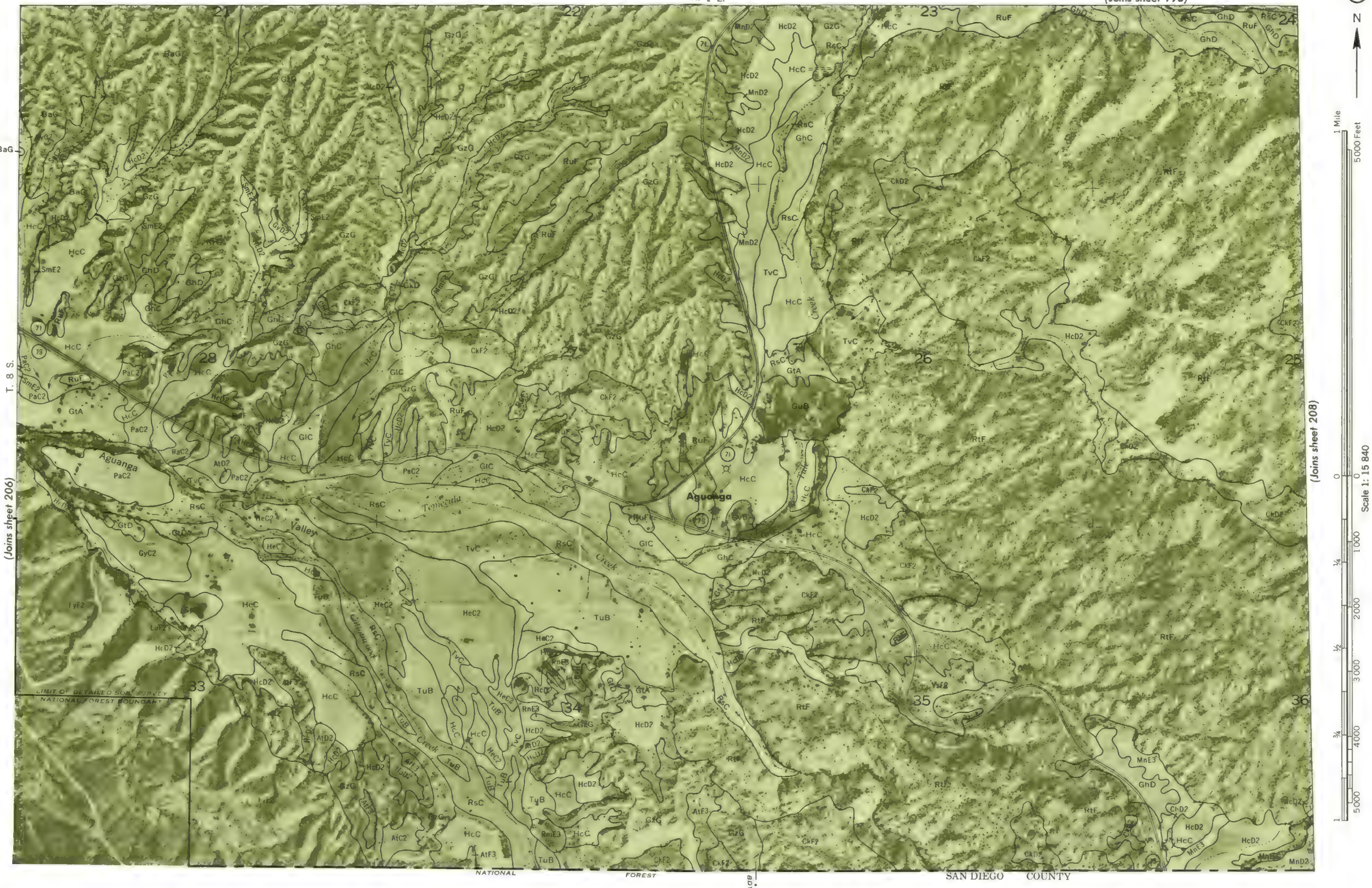
T. 8 S.

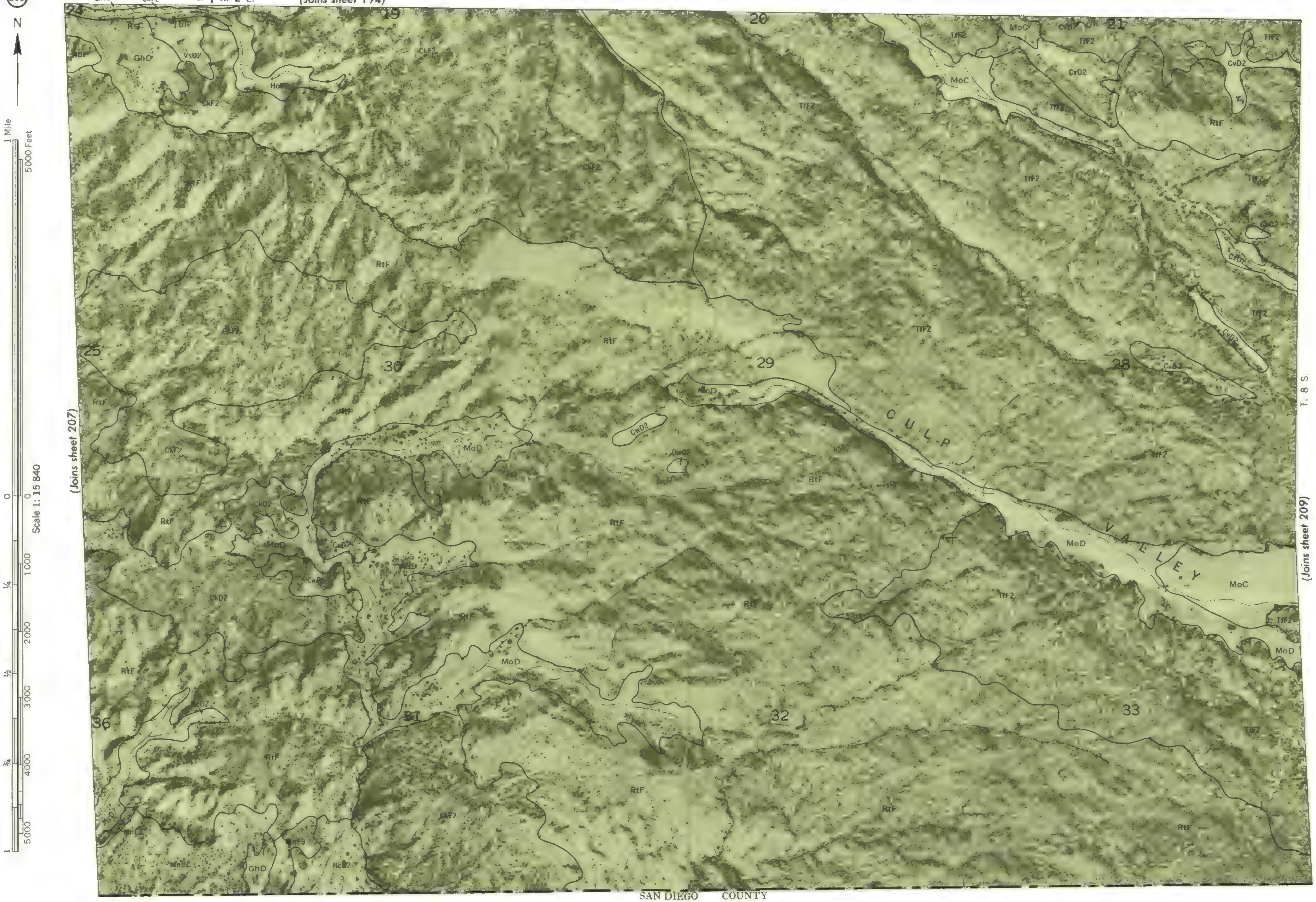
(Joins sheet 207)

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 206

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station


R. 1 E.
(Joins sheet 193)
(Joins sheet 206)
(Joins sheet 208)
T. 8 S.
Aguanga
Temecula
Valley
Creek
LIMIT OF DETAILED SOIL SURVEY
NATIONAL FOREST BOUNDARY
NATIONAL FOREST
SAN DIEGO COUNTY
N
1 Mile
5000 Feet
Scale 1: 15 840



WESTERN RIVERSIDE AREA, CALIFORNIA NO. 208

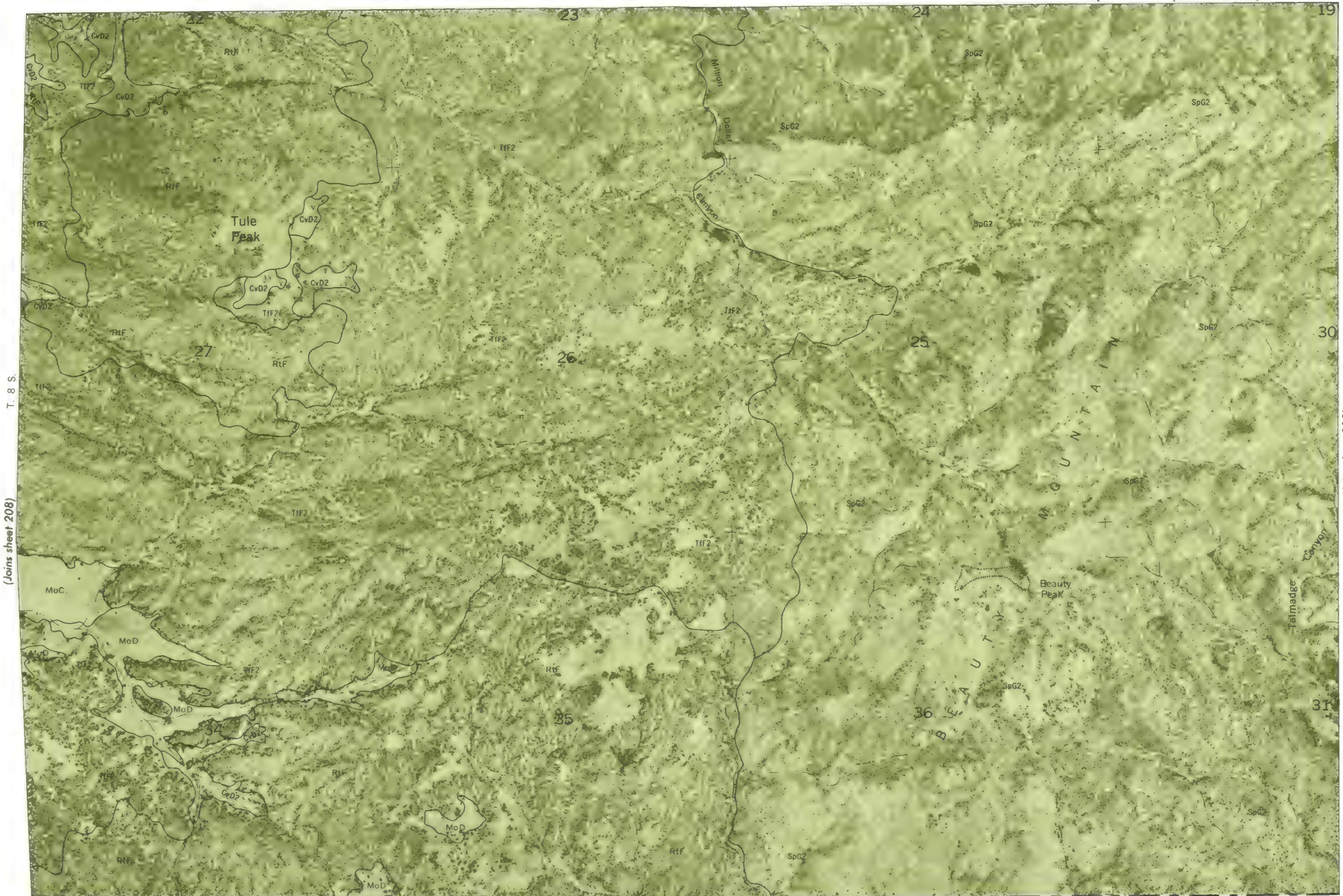
Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

R. 2 E. | R. 3 E. (Joins sheet 195)

T. 8 S.

(Joins sheet 208)



(Joins sheet 210)

SAN DIEGO COUNTY

N

Scale 1: 15 840

1 Mile 0 ¼ ½ ¾ 1

5000 Feet 0 1000 2000 3000 4000 5000

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

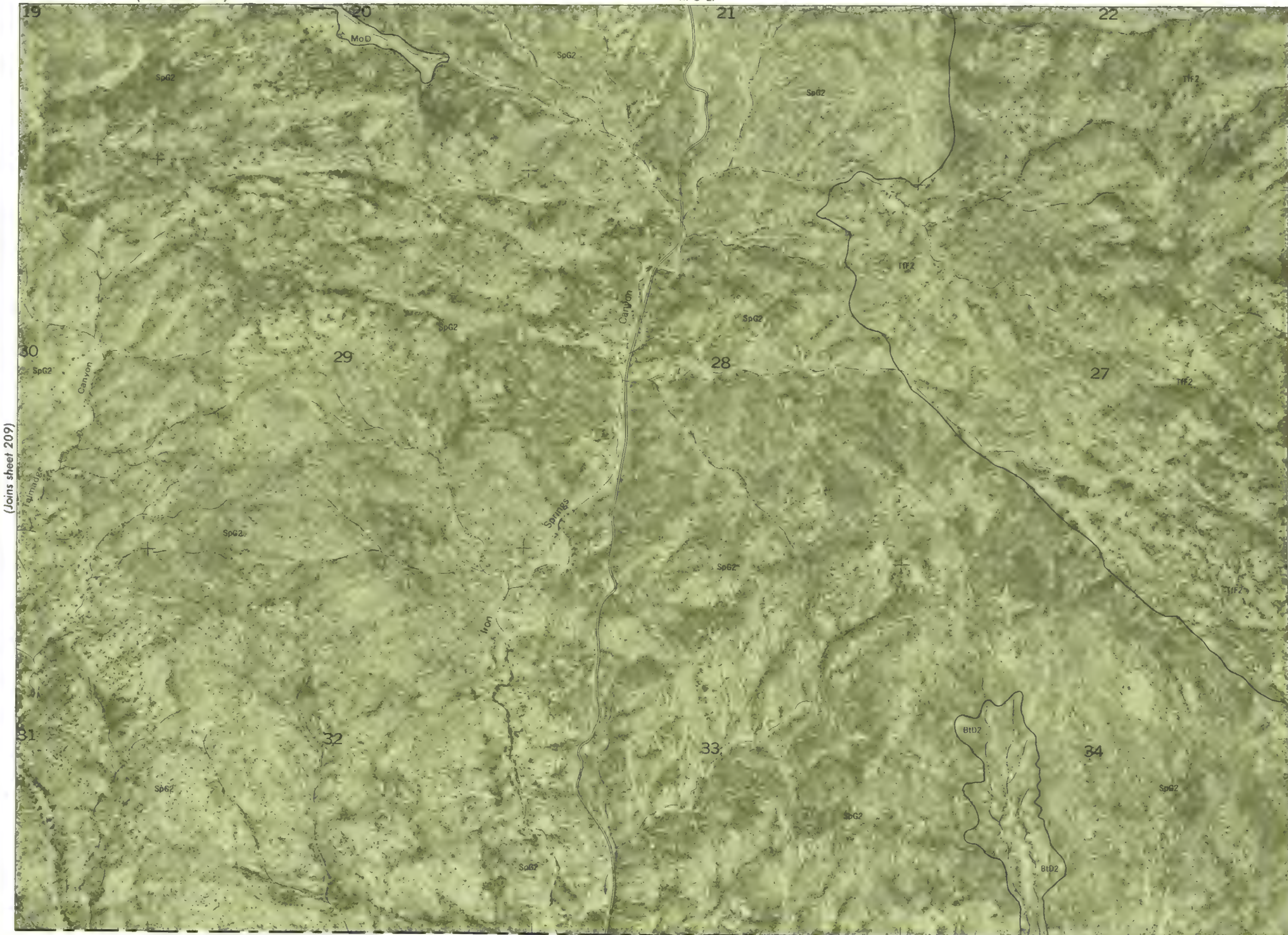
Land division corners are approximately positioned on this map.

N

(Joins sheet 196)

R. 3 E.

(Joins sheet 209)



T. 8 S.

(Joins sheet 211)

SAN DIEGO COUNTY

Scale 1: 15 840

1 Mile — 0 — ¼ — ½ — ¾ — 1

5000 Feet — 0 — 1000 — 2000 — 3000 — 4000 — 5000

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 210

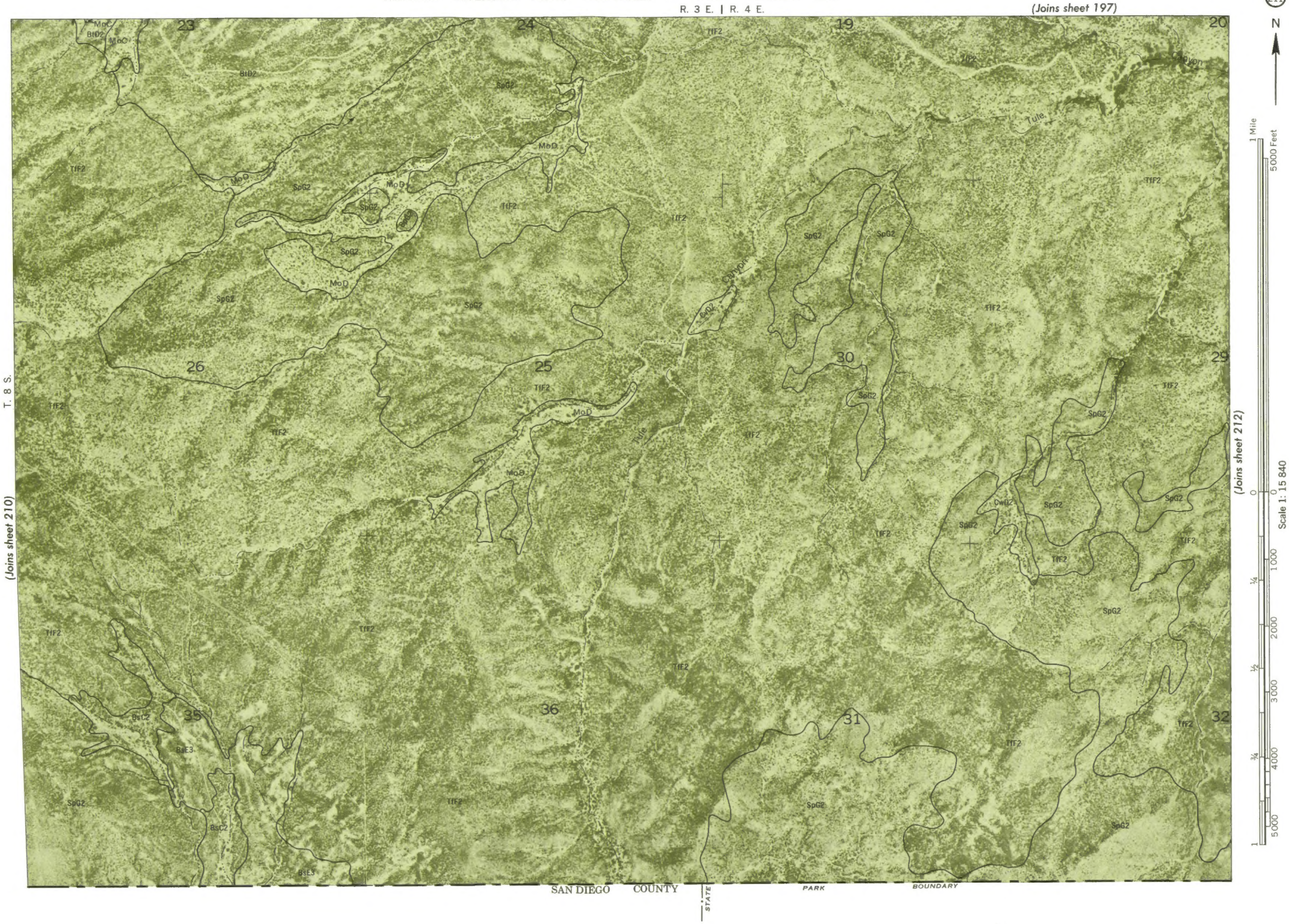
Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station

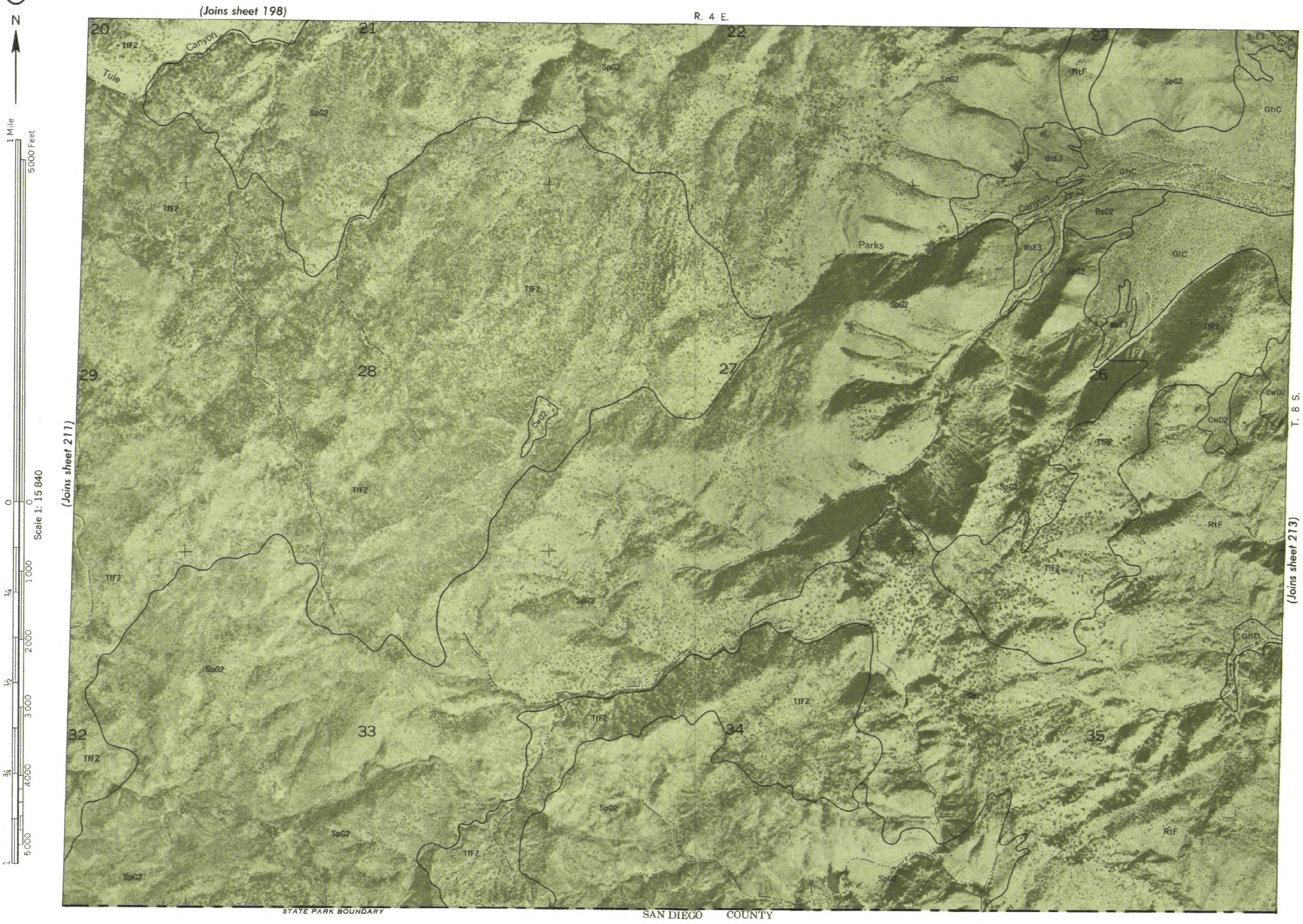
This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 211



WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 212



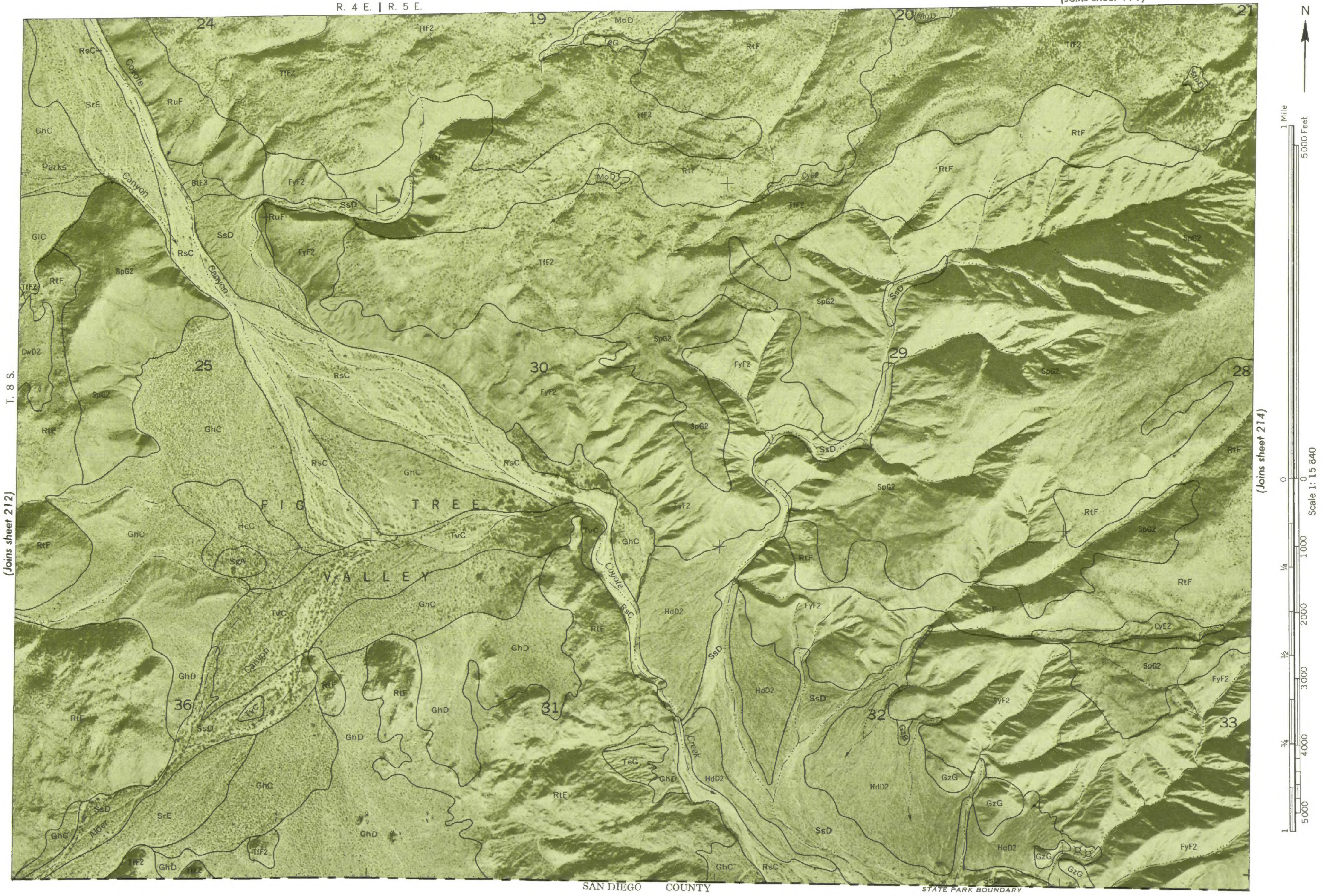
WESTERN RIVERSIDE AREA, CALIFORNIA NO. 212

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.

213

(Joins sheet 199)

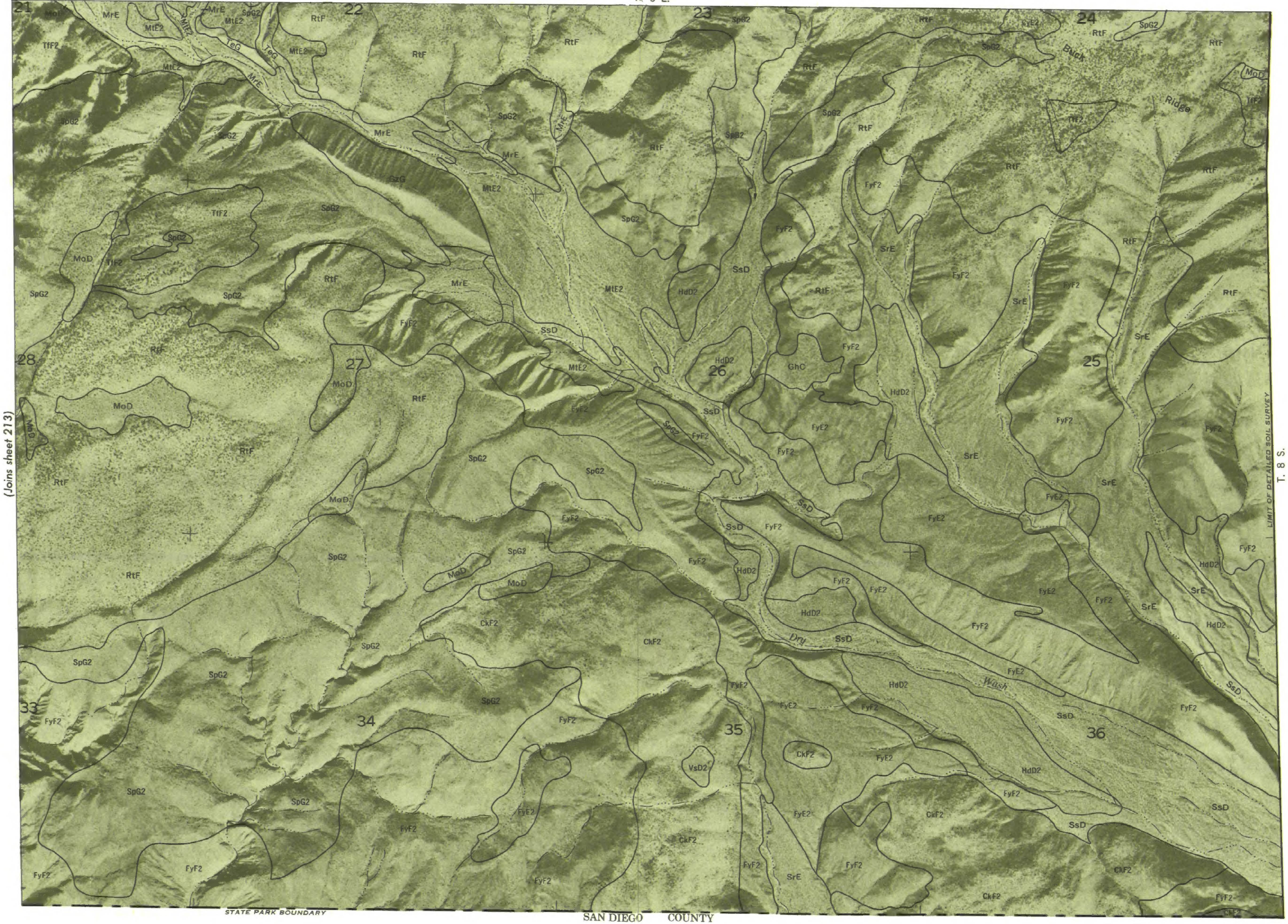


This map is part of a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station.
Land division corners are approximately positioned on this map.

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 213

(Joins sheet 200)

WESTERN RIVERSIDE AREA, CALIFORNIA — SHEET NUMBER 214



N

Scale 1: 15 840

1 Mile

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000 Feet

WESTERN RIVERSIDE AREA, CALIFORNIA NO. 214

Land division corners are approximately positioned on this map.

This map a set compiled in 1969 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of California Agricultural Experiment Station